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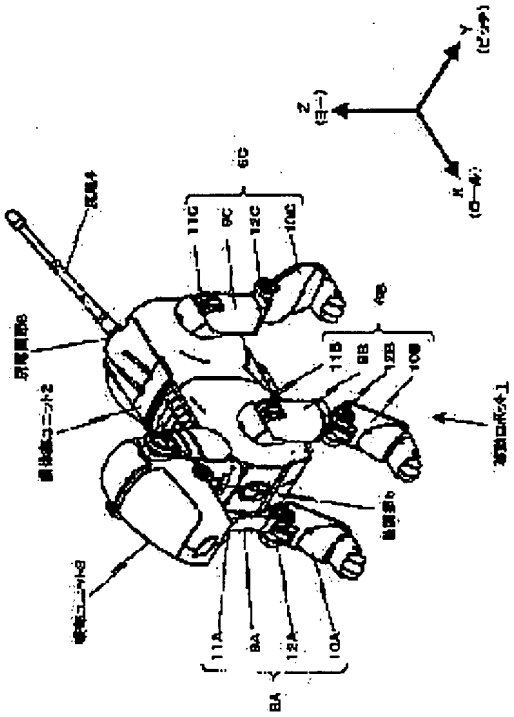
(54) AUTHORING SYSTEM, AUTHORING METHOD AND RECORDING MEDIUM

(57)Abstract:
PROBLEM TO BE SOLVED: To support formation and edition of a series of command/data to describe a motion pattern of a robot.
SOLUTION: An action editing window is constituted as a two-dimensional time line type time table of a time axis in the lateral direction and a channel in the vertical direction. Each of constitutional contents of action such as a time ruler, a key frame channel, a motion channel, a sound channel, an LED motion channel, etc., is displayed in time series in the time line table. It is possible for a user to edit the data while confirming synchronisim between each of the constitutional elements of the action.



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CLAIMS

[Claim(s)]
[Claim 1] The user input section which is an authoring system for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data, and inputs a command and data from a user, The user presentation section which presents the edit field which put in order each time series data which constitute action synchronous along with the time-axis, The authoring system characterized by providing the time series data-editing section which was prepared for each [which constitutes action] time series data of every, and which creates or edits the time series data which correspond based on the user input through said user presentation section.
[Claim 2] One of the time series data which constitute action is an authoring system according to claim 1 characterized by being motion data which described serial actuation of each joint of a multi-Seki nodal character object.
[Claim 3] One of the time series data which constitute action is an authoring system according to claim 1 characterized by being motion data which specified serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly by arranging the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis.
[Claim 4] One of the time series data which constitute action is an authoring system according to claim 1 characterized by being sound data by which a voice output is carried out to playback of action synchronizing with a time amount target.
[Claim 5] Sound data are an authoring system according to claim 4 characterized by what is described in a MIDI (Musical Instrumental Digital Interface) format or a WAVE format.
[Claim 6] One of the time series data which constitute action is an authoring system according to claim 1 characterized by being the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output is carried out to playback of action synchronizing with a time amount target.
[Claim 7] An indicator indicative data is an authoring system according to claim 1 characterized by what is described in a MIDI (Musical Instrumental Digital Interface) format.
[Claim 8] The edit field which said user presentation section presents is an authoring

system according to claim 1 characterized by coming to arrange the time series data display channel for every time series data to a lengthwise direction along with the time-axis set as the longitudinal direction.
[Claim 9] The edit field which said user presentation section presents is an authoring system according to claim 8 characterized by including the time amount ruler which consists of graduations which carry out the real-time display of the time-axis.
[Claim 10] The edit field which said user presentation section presents is an authoring system according to claim 8 characterized by having one or more time stamp Rhine run to a lengthwise direction to show the applicable time of day specified by the time amount ruler.
[Claim 11] It is the authoring system according to claim 8 which the edit field which said user presentation section presents is equipped with current time stamp Rhine run to a lengthwise direction to show the current time on the time-axis specified by the time amount ruler, and is characterized by what this current time stamp Rhine is moved for to the location by which user actuation was carried out on the time amount ruler.
[Claim 12] The edit field which said user presentation section presents is an authoring system according to claim 8 characterized by having the viewing window which previews a motion of the multi-Seki nodal character object in current time.
[Claim 13] As one of the time series data which constitute action The motion data which specified serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly by arranging the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis are contained. The edit field which said user presentation section presents is an authoring system according to claim 8 characterized by what it has a key frame channel for displaying each key frame or its thumbnail according to the time-axis which a time amount ruler specifies for.
[Claim 14] The authoring system according to claim 13 characterized by following the key frame within a key frame channel, or drag actuation of the thumbnail, and changing the time of day of a key frame.
[Claim 15] The authoring system according to claim 13 characterized by starting the pause edit display which answers the key frame within a key frame channel, or own alternative actuation of the thumbnail, and edits the corresponding pause.
[Claim 16] the edit field which the motion data which described serial actuation of each joint of a multi-Seki nodal character object as one of the time series data which constitute action be contain , and said user presentation section present be an authoring system according to claim 8 characterize by what it have a motion channel for meet the time-axis which a time amount ruler specify , and edit and display the contents of the motion for .
[Claim 17] Said motion channel is an authoring system according to claim 16 characterized by coming to arrange each timing chart showing the serial actuation for every joint of a multi-Seki nodal character object to a lengthwise direction.
[Claim 18] The authoring system according to claim 17 characterized by changing actuation of the joint in the time of day which follows and corresponds to the drag actuation on the timing chart within said motion channel.
[Claim 19] the edit field which the sound data by which a voice output be carry out to playback of action as one of the time series data which constitute action synchronizing with a time amount target be contain , and said user presentation section present be an

authoring system according to claim 8 characterize by what it have a sound channel for display the contents of the sound along with the time-axis which a time amount ruler specify for .
[Claim 20] the edit field which the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output be carry out to playback of action as one of the time series data which constitute action synchronizing with a time amount target be contain , and said user presentation section present be the authoring system according to claim 8 characterize by what it have a display indicator channel for display the contents of the indicator indicative data along with the time-axis which a time amount ruler specify for .
[Claim 21] it be the authoring system according to claim 1 which the sound data by which a voice output be carry out to playback of action as one of the time series data which constitute action synchronizing with a time amount target be contain , and be characterize by what the sound edit field for said user presentation section meet the time-axis which a time amount ruler specify , and display and edit the contents of the sound be further display for .
[Claim 22] Said sound edit field is an authoring system according to claim 21 characterized by what a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis including the score channel constituted by a piano keyboard and the basic grid of time amount shaft orientations, and a sound is edited for by coloring a desired time-of-day list on this score channel in the color which corresponds on the cel corresponding to a scale at a note.
[Claim 23] Said sound edit field is an authoring system according to claim 21 characterized by including the velocity channel which displays the strength of the velocity for every sound along with a time-axis.
[Claim 24] it be the authoring system according to claim 1 which the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output be carry out to playback of action as one of the time series data which constitute action synchronizing with a time amount target be contain , and be characterize by what the display indicator edit field for said user presentation section meet the time-axis which a time amount ruler specify , and display and edit the contents of the indicator indicative data display for further .
[Claim 25] Said display indicator edit field is an authoring system according to claim 24 to which at least each part is characterized by what the score for every list is edited for by being constituted by the basic grid of the list of parts, and time amount shaft orientations which has arranged the display indicator, and displaying the lighting situation of the display indicator like each part on a time-axis on a score channel including a score channel.
[Claim 26] Said user presentation section is an authoring system according to claim 1 characterized by displaying further the preview window for checking visually action of the multi-Seki nodal character object generated based on each time series data edited by the time series data-editing section.
[Claim 27] It is the authoring system according to claim 26 characterized by what one of the time series data which constitute action is motion data which described serial actuation of each joint of a multi-Seki nodal character object, and said preview window is equipped with 3D view field which displays in three dimensions a motion of the multi-

Seki nodal character object generated based on motion data for.
[Claim 28] One of the time series data which constitute action is an authoring system according to claim 26 characterized by what it has a display indicator actuation preview field for displaying the actuation of a display indicator based on [are the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output is carried out to playback of action synchronizing with a time amount target, and] an indicator indicative data in said preview window synchronizing with the preview of other time series data for.
[Claim 29] Said user presentation section is an authoring system according to claim 1 characterized by displaying further the pause window for editing the pause of a multi-Seki nodal character object by GUI actuation.
[Claim 30] Said pause window is an authoring system according to claim 29 characterized by what the stereo appointed field which displays a multi-Seki nodal character object on an expansion top view, and receives the own alternative of the part which can be edited is included for.
[Claim 31] Said pause window is an authoring system according to claim 29 characterized by what the part of a multi-Seki nodal character object which can be edited, and the list appointed field which displays the set point in a list are included for.
[Claim 32] Said pause window is an authoring system according to claim 29 characterized by what the set point field which indicates the maximum by list is included for in the setting part name of each part of a multi-Seki nodal character object which can be edited, the set point, and the minimum value list that can be set up.
[Claim 33] Said pause window is an authoring system according to claim 29 characterized by what 3D viewing area which receives the own alternative of the part which can be edited on this 3D display while carrying out 3D display of the whole body image of the multi-Seki nodal character object generated by 3D graphics is included for.
[Claim 34] It is the authoring system according to claim 29 which is further equipped with a data input means to input from the outside the time series data which constitute action of a multi-Seki nodal character object, and is characterized by what said pause window displays for the pause generated based on the data inputted from said data input means.
[Claim 35] One of the time series data which constitute action It is motion data which specified serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly by arranging the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis. Said user presentation section is an authoring system according to claim 1 characterized by what the motion preview window which arranged one or more key frames which constitute a motion, or the thumbnail of those according to the time series at the time of motion playback is further displayed for.
[Claim 36] It is the authoring approach for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data. The user presentation step which presents the edit field which put in order each time series data which constitute action synchronous along with the time-axis, The authoring approach characterized by providing the time series data-editing step which creates or edits the time series data which correspond based on the user input through the edit field by said user presentation step prepared for each [which constitutes action] time

series data of every.
[Claim 37] One of the time series data which constitute action is the authoring approach according to claim 36 characterized by being motion data which described serial actuation of each joint of a multi-Seki nodal character object.
[Claim 38] One of the time series data which constitute action is the authoring approach according to claim 36 characterized by being motion data which specified serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly by arranging the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis.
[Claim 39] One of the time series data which constitute action is the authoring approach according to claim 36 characterized by being sound data by which a voice output is carried out to playback of action synchronizing with a time amount target.
[Claim 40] Sound data are the authoring approach according to claim 39 characterized by what is described in a MIDI (Musical Instrumental Digital Interface) format or a WAVE format.
[Claim 41] One of the time series data which constitute action is the authoring approach according to claim 36 characterized by being the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output is carried out to playback of action synchronizing with a time amount target.
[Claim 42] An indicator indicative data is the authoring approach according to claim 36 characterized by what is described in a MIDI (Musical Instrumental Digital Interface) format.
[Claim 43] The authoring approach according to claim 36 characterized by showing the edit field which comes to arrange the time series data display channel for every time series data to a lengthwise direction at said user presentation step along with the time-axis set as the longitudinal direction.
[Claim 44] The authoring approach according to claim 43 characterized by showing the edit field containing the time amount ruler which consists of said user presentation steps with the graduation which carries out the real-time display of the time-axis.
[Claim 45] The authoring approach according to claim 43 characterized by showing an edit field equipped with one or more time stamp Rhine run to a lengthwise direction for said user presentation step to show the applicable time of day specified by the time amount ruler.
[Claim 46] The authoring approach according to claim 43 characterized by what an edit field equipped with current time stamp Rhine run to a lengthwise direction for said user presentation step to show the current time on the time-axis specified by the time amount ruler is shown, and it has further for the step which moves this current time stamp Rhine to the location by which user actuation was carried out on the time amount ruler.
[Claim 47] The authoring approach according to claim 43 characterized by having further the step which presents the viewing window which previews a motion of the multi-Seki nodal character object in current time.
[Claim 48] As one of the time series data which constitute action The motion data which specified serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly by arranging the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis are contained. The authoring approach according to claim 43 characterized by

what an edit field equipped with the key frame channel for displaying each key frame or its thumbnail at said user presentation step according to the time-axis which a time amount ruler specifies is shown for.
[Claim 49] The authoring approach according to claim 48 characterized by including further the step which follows the key frame within a key frame channel, or drag actuation of the thumbnail, and changes the time of day of a key frame.
[Claim 50] The authoring approach according to claim 48 characterized by including further the step which starts the pause edit display which answers the key frame within a key frame channel, or own alternative actuation of the thumbnail, and edits the corresponding pause.
[Claim 51] the authoring approach according to claim 43 characterize by what the edit field equipped with the motion channel for the motion data which described serial actuation of each joint of a multi-Seki nodal character object as one of the time series data which constitute action be contain , meet the time-axis which a time amount ruler specify at said user presentation step , and edit and display the contents of the motion be show for .
[Claim 52] The authoring approach according to claim 51 characterized by arranging each timing chart which expresses the serial actuation for every joint of a multi-Seki nodal character object with said user presentation step to a lengthwise direction, and displaying a motion channel.
[Claim 53] The authoring approach according to claim 52 characterized by having further the step which changes actuation of the joint in the time of day which follows and corresponds to the drag actuation on the timing chart within said motion channel.
[Claim 54] the authoring approach according to claim 43 characterize by what the sound data by which a voice output be carry out to playback of action as one of the time series data which constitute action synchronizing with a time amount target be contain , and the edit field equipped with the sound channel for display the contents of the sound at said user presentation step along with the time-axis which a time amount ruler specify be show for .
[Claim 55] the authoring approach according to claim 43 characterize by what the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output be carry out to playback of action as one of the time series data which constitute action synchronizing with a time amount target be contain , and the edit field equipped with the display indicator channel for display the contents of the indicator indicative data at said user presentation step along with the time-axis which a time amount ruler specify show for .
[Claim 56] The authoring approach according to claim 36 characterized by what it have further for the step which display the sound edit field for the sound data by which a voice output be carried out to playback of action as one of the time series data which constitute action synchronizing with a time amount target be contained , meet the time-axis which a time amount ruler specify , and display and edit the contents of the sound .
[Claim 57] Said sound edit field is the authoring approach according to claim 56 characterized by what a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis including the score channel constituted by a piano keyboard and the basic grid of time amount shaft orientations , and a sound is edited for by coloring a desired time-of-day list on this score channel in the color which

corresponds on the cel corresponding to a scale at a note .
[Claim 58] Said sound edit field is the authoring approach according to claim 56 characterized by including the velocity channel which displays the strength of the velocity for every sound along with a time-axis.
[Claim 59] The authoring approach according to claim 36 characterized by to have further the step which display the display indicator edit field for the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output be carried out to playback of action as one of the time series data which constitute action synchronizing with a time-amount target be contained , meet the time-axis which a time-amount ruler specify , and display and edit the contents of the indicator indicative data .
[Claim 60] Said display indicator edit field is the authoring approach according to claim 59 that at least each part is characterized by what the score for every list is edited for, by being constituted by the basic grid of the list of parts, and time amount shaft orientations which has arranged the display indicator, and displaying the lighting situation of the display indicator like each part on a time-axis on a score channel including a score channel.
[Claim 61] The authoring approach according to claim 36 characterized by having further the step which displays the preview window for checking visually action of the multi-Seki nodal character object generated based on each time series data edited in the time series data-editing step.
[Claim 62] One of the time series data which constitute action is the authoring approach according to claim 61 which is motion data which described serial actuation of each joint of a multi-Seki nodal character object, and is characterized by what a motion of the multi-Seki nodal character object generated based on motion data is displayed in three dimensions for to 3D view field at the step which displays said preview window.
[Claim 63] One of the time series data which constitute action is the authoring approach according to claim 61 which is the indicator indicative data which described lighting/disappearance actuation of a display indicator by which a display output is carried out to playback of action synchronizing with a time-amount target, and is characterized by what the actuation of a display indicator based on an indicator indicative data is displayed for on a display indicator actuation preview field synchronizing with the preview of other time series data at the step which displays said preview window.
[Claim 64] The authoring approach according to claim 36 characterized by having further the step which displays the pause window for editing the pause of a multi-Seki nodal character object by GUI actuation.
[Claim 65] Said pause window is the authoring approach according to claim 64 characterized by what the stereo appointed field which displays a multi-Seki nodal character object on an expansion top view, and receives the own alternative of the part which can be edited is included for.
[Claim 66] Said pause window is the authoring approach according to claim 64 characterized by what the part of a multi-Seki nodal character object which can be edited, and the list appointed field which displays the set point in a list are included for.
[Claim 67] Said pause window is the authoring approach according to claim 64 characterized by what the set point field which indicates the maximum by list is included for in the setting part name of each part of a multi-Seki nodal character object which can

be edited, the set point, and the minimum value list that can be set up.
[Claim 68] Said pause window is the authoring approach according to claim 64 characterized by what 3D viewing area which receives the own alternative of the part which can be edited on this 3D display while carrying out 3D display of the whole body image of the multi-Seki nodal character object generated by 3D graphics is included for.
[Claim 69] Said pause window is the authoring approach according to claim 64 characterized by what the pause generated based on the data inputted [in / have further the data input step which inputs from the outside the time series data which constitute action of a multi-Seki nodal character object, and / said data input step] is displayed for.
[Claim 70] One of the time series data which constitute action It is motion data which specified serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly by arranging the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis. The authoring approach according to claim 36 characterized by what it has further for the step which displays the motion preview window which arranged one or more key frames which constitute a motion, or the thumbnail of those according to the time series at the time of motion playback.
[Claim 71] It is the storage which stored physically the computer software described to perform processing for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data on computer system in the computer-readable format. The user presentation step which presents the edit field which put in order each time series data from which said computer software constitutes action synchronous along with the time-axis, The storage characterized by providing the time series data-editing step which creates or edits the time series data which correspond based on the user input through the edit field by said user presentation step prepared for each [which constitutes action] time series data of every.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the authoring system and the authoring approach for supporting creation and edit of the data according to a predetermined scenario, and relates to the authoring system and the authoring approach of supporting

creation and edit of a series of command/data which describe a robot's predetermined pattern of operation especially.
[0002] Furthermore, in detail, this invention relates to the authoring system and the authoring approach of supporting creation and edit of a pattern of operation using the set of the components which specify a robot's operating state, and relates to the authoring system and the authoring approach of arranging each part article on a computer display, and supporting creation and edit of a pattern of operation especially.
[0003]
[Description of the Prior Art] The thing of the machinery which performs movement modeled on actuation of human being using the electric or magnetic operation is called "robot." It is said that a robot's origin of a word originates in ROBOTA (slave machine) of a slab word. Although it was in our country that a robot began to spread from the end of the 1960s, the many were the industrial robots (industrial robot) in works aiming at automation, full automation, etc. of production, such as a manipulator and a carrier robot.
[0004] Recently, the researches and developments about the structure of leg formula mobile robots, such as a robot (humanoid robot) of "the human form" which imitated the body mechanism of the animal which performs 2-pair-of-shoes walks in erect posture, such as a pet mold robot which imitated the body mechanism of the animal of quadrapedalism and its actuation like a dog or a cat or Homo sapiens, and an ape, and actuation, or "a human mold", or its stable walk control progress, and the expectation for utilization has also been growing. although these leg formula mobile robot compares with a crawler type robot, it is unstable and attitude control and walk control become difficult -- rise and fall of a stairway and an obstruction -- getting over -- etc. -- it excels in the point that flexible walk / transit actuation is realizable.
[0005] Like an arm type robot, the robot of a deferment type which is implanted and used for a certain specific location works only in fixed and local workspaces, such as assembly, a sorting activity, etc. of components. On the other hand, the robot of workspace of a portable type is un-restrictive, and he can move free in a predetermined path or non-path top, and the human activity of predetermined or arbitration can be executed by proxy, or he can offer the various services which replace Homo sapiens, a dog, or other life objects.
[0006] As one of the applications of a leg formula mobile robot, vicarious execution of various kinds of difficulty activities in an industrial activity, a production activity, etc. is mentioned. For example, it is vicarious execution of the maintenance in a nuclear power plant, a thermal power station plant, and a petrochemical plant, conveyance and assembly operation of the components in a plant, cleaning in a skyscraper, and the risk activity and difficulty activity like the rescue in a fire site and others etc.
[0007] Moreover, the application of "symbiosis" or "entertainment" of a life adhesion mold, i.e., human being, is mentioned rather than above-mentioned activity exchange as other applications of a leg formula mobile robot. This kind of robot emulates the rich feeling expression using the mechanisms of operation and the limbs of a leg formula ambulatory exercise with comparatively high intelligence, such as Homo sapiens or a dog (pet). Moreover, it is also required that the lively response expression which it not only performs faithfully the pattern of operation inputted beforehand, but corresponded dynamically to a partner's language and attitudes ("it strikes") should be realized. ["it praises" or "he scolding",]

[0008] The conventional toy machine has the fixed relation between user actuation and response actuation, and cannot change actuation of a toy according to liking of a user. Consequently, a user becomes ********** soon about the toy which repeats only the same actuation.
[0009] On the other hand, the intellectual robot has the behavioral model and learning model resulting from actuation, and realizes autonomous thinking and motion control by changing a model based on input, such as voice from the outside, and an image, a tactile sense, and opting for actuation. When a robot prepares a feeling model and an instinct model, the autonomous action according to a robot's own feeling and instinct can be expressed. Moreover, when a robot equips a picture input device and voice-input/output equipment and performs image recognition processing and speech recognition processing, it also becomes possible to realize realistic communication with human being on more advanced intellectual level.
[0010] Moreover, by answering having detected the stimulus from the outside, such as user actuation, and changing this model, namely, giving the "study effectiveness", or it does not get bored for a user, the pattern of operation which was adapted for liking can be offered.
[0011] The leg formula mobile robot of these days has high information processing capacity, and can regard the robot itself as a kind of computing system. Therefore, the altitude and a series of complicated operating sequences which are constituted by the combination of the pattern of operation realized on a robot or two or more fundamental patterns of operation are built according to the same activity as computer programming.
[0012] Moreover, a robot's diffusion rate will increase increasingly from now on, and it will be expected that a robot permeates deeply not only the industrial world but ordinary homes and everyday life. About the product which pursues entertainment nature, it is especially expected [that a consuming public layer without the advanced knowledge about a computer or computer programming purchases and uses a robot in many cases, and]. It is thought desirable to offer the tool for supporting creating and editing a robot's operating sequence comparatively easily and efficiently by interactive processing also for such a general user, i.e., an authoring system.
[0013]
[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the outstanding authoring system and the outstanding authoring approach of supporting creation and edit of a series of command/data which describe a robot's predetermined pattern of operation.
[0014] The further purpose of this invention is to offer the outstanding authoring system and the outstanding authoring approach of supporting creation and edit of a pattern of operation using the set of the components which specify a robot's operating state.
[0015] The further purpose of this invention is to offer the outstanding authoring system and the outstanding authoring approach of arranging each part article on a computer display, and supporting creation and edit of a pattern of operation.
[0016]
[Means for Solving the Problem and its Function] This invention is made in consideration of the above-mentioned technical problem. The 1st side face The user input section which is an authoring system for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data, and

inputs a command and data from a user, The user presentation section which presents the edit field which put in order each time series data which constitute action synchronous along with the time-axis, It is the authoring system characterized by providing the time series data-editing section which was prepared for each [which constitutes action] time series data of every, and which creates or edits the time series data which correspond based on the user input through said user presentation section.

[0017] However, it does not especially ask whether the "system" said here means the thing of an object which gathered logically, and two or more equipments (or functional module which realizes a specific function) are in a case with single each equipment and functional module.

[0018] Although multi-Seki nodal character objects are leg formula mobile robots, such as 2 pairs of shoes which consists of two or more joint actuators, and 4 etc. pairs of shoes, they may be the other articulated robot or a character in which animation is generated by computer graphics processing according to actuation of a joint.

[0019] Moreover, as time series data which constitute action of a multi-Seki nodal character object, it is motion data which described serial actuation of each joint of a multi-Seki nodal character object, for example. serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly because motion data arrange the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis -- with -- **** -- it can also specify.

[0020] Moreover, other examples of the time series data which constitute action are sound data by which a voice output is carried out to playback of action synchronizing with a time amount target. Sound data can be described in a MIDI (Musical Instrumental Digital Interface) format or a WAVE format.

[0021] Moreover, other examples of the time series data which constitute action are the indicator indicative datas which described lighting/disappearance actuation, the display indicator, i.e., LED, by which a display output is carried out to playback of action synchronizing with a time amount target. An indicator indicative data can be described in a MIDI format.

[0022] The edit field which said user presentation section presents can arrange and constitute the time series data display channel for every time series data in a lengthwise direction along with the time-axis set as the longitudinal direction.

[0023] That is, according to the authoring system concerning the 1st side face of this invention, motion data, sound data, LED actuation data, etc. can arrange and display each time series data which constitute a mobile robot's action along with a time-axis on the time table of a two-dimensional time-line format. therefore, creation and edit of can be done, checking the synchronization between each time series data visually -- the work environment of intelligible action edit can be offered efficiently and intuitively.

[0024] You may make it include the time amount ruler which consists of graduations which carry out the real-time display of the time-axis to the edit field which said user presentation section presents. In such a case, the synchronization with each time series data channel and a time-axis can be made easy to check visually.

[0025] Moreover, you may make it the edit field which said user presentation section presents equipped with one or more time stamp Rhine run to a lengthwise direction to show the applicable time of day specified by the time amount ruler. In such a case, on the

basis of time stamp Rhine, the advance situation between each time series data channel is visually made a check, or it becomes easy to check visually the synchronization between each time series data channel.

[0026] Moreover, the edit field which said user presentation section presents may be equipped with current time stamp Rhine run to a lengthwise direction to show the current time on the time-axis specified by the time amount ruler. You may make it move this current time stamp Rhine to the location by which user actuation was carried out on the time amount ruler.

[0027] Moreover, the edit field which said user presentation section presents may be equipped with the viewing window which previews a motion of the multi-Seki nodal character object in current time.

[0028] Moreover, the edit field which said user presentation section presents may be equipped with the key frame channel for displaying each key frame or its thumbnail according to the time-axis which a time amount ruler specifies. Drag actuation of a key frame or its thumbnail is followed, and you may make it receive the time change of a key frame within this key frame channel. Moreover, you may make it start the pause edit display which answers the key frame within a key frame channel, or own alternative actuation of the thumbnail, and edits the corresponding pause.

[0029] Moreover, the edit field which said user presentation section presents may be equipped with the motion channel for meeting the time-axis which a time amount ruler specifies, and editing and displaying the contents of the motion. This motion channel arranges each timing chart showing the serial actuation for every joint of a multi-Seki nodal character object to a lengthwise direction, and is constituted. You may make it receive modification of the joint in the time of day which follows and corresponds to the drag actuation on the timing chart within a motion channel of operation.

[0030] Moreover, the edit field which said user presentation section presents may be equipped with the sound channel for displaying the contents of the sound along with the time-axis which a time amount ruler specifies, and the display indicator channel for displaying the contents of the indicator indicative data along with the time-axis which a time amount ruler specifies.

[0031] Moreover, you may make it the user presentation section display further the sound edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the sound.

[0032] The sound edit field may contain the score channel constituted by a piano keyboard and the basic grid of time amount shaft orientations. In such a case, a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis, and a sound can be edited on a score channel by coloring a desired time-of-day list in the color which corresponds on the cel corresponding to a scale at a note. Moreover, you may make it display collectively the velocity channel which displays the strength of the velocity for every sound along with a time-axis.

[0033] Moreover, you may make it the user presentation section display further the display indicator edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the indicator indicative data.

[0034] A display indicator edit field is constituted by the basic grid of the list of parts, and time amount shaft orientations which has arranged the display indicator, and may also contain a score channel. In such a case, on a score channel, at least each part can edit

the score for every list by displaying the lighting situation of the display indicator like each part on a time-axis.
[0035] Moreover, you may make it the user presentation section display further the preview window for checking visually action of the multi-Seki nodal character object generated based on each time series data edited by the time series data-editing section.
[0036] This preview window may be equipped with 3D view field which displays in three dimensions a motion of the multi-Seki nodal character object generated based on motion data. Moreover, the preview window may be equipped with the display indicator actuation preview field for displaying the actuation of a display indicator based on an indicator indicative data synchronizing with the preview of other time series data.
[0037] Moreover, you may make it the user presentation section display further the pause window for editing the pause of a multi-Seki nodal character object by GUI actuation.
[0038] This pause window may include the stereo appointed field which displays a multi-Seki nodal character object on an expansion top view, and receives the own alternative of the part which can be edited. Moreover, the pause window may include the part of a multi-Seki nodal character object which can be edited, and the list appointed field which displays the set point in a list. Moreover, the pause window may include the set point field which indicates the maximum by list in the setting part name of each part of a multi-Seki nodal character object which can be edited, the set point, and the minimum value list that can be set up. Moreover, a pause window may contain 3D viewing area which receives the own alternative of the part which can be edited on this 3D display while carrying out 3D display of the whole body image of the multi-Seki nodal character object generated by 3D graphics.
[0039] Moreover, the authoring system may be further equipped with a data input means to input from the outside the time series data which constitute action of a multi-Seki nodal character object. In such a case, you may make it a pause window display the pause generated based on the data inputted from said data input means.
[0040] Moreover, you may make it the user presentation section display further the motion preview window which arranged one or more key frames which constitute a motion, or the thumbnail of those according to the time series at the time of motion playback.
[0041] Moreover, the 2nd side face of this invention is the authoring approach for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data. The user presentation step which presents the edit field which put in order each time series data which constitute action synchronous along with the time-axis, It is the authoring approach characterized by providing the time series data-editing step which creates or edits the time series data which correspond based on the user input through the edit field by said user presentation step prepared for each [which constitutes action] time series data of every.
[0042] Here, as time series data which constitute action of a multi-Seki nodal character object, it is motion data which described serial actuation of each joint of a multi-Seki nodal character object, for example. serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly because motion data arrange the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis -- with -- **** -- it can also specify.
[0043] Moreover, other examples of the time series data which constitute action are

sound data by which a voice output is carried out to playback of action synchronizing with a time amount target, and can be described in a MIDI format or a WAVE format. Moreover, other examples of the time series data which constitute action are the indicator indicative datas which described lighting/disappearance actuation, the display indicator, i.e., LED, by which a display output is carried out to playback of action synchronizing with a time amount target, and can be described in a MIDI format.

[0044] The edit field shown in said user presentation step can arrange and constitute the time series data display channel for every time series data in a lengthwise direction along with the time-axis set as the longitudinal direction.

[0045] That is, according to the authoring approach concerning the 2nd side face of this invention, motion data, sound data, LED actuation data, etc. can arrange and display each time series data which constitute a mobile robot's action along with a time-axis on the time table of a two-dimensional time-line format. therefore, creation and edit of can be done, checking the synchronization between each time series data visually -- the work environment of intelligible action edit can be offered efficiently and intuitively.

[0046] You may make it include the time amount ruler which consists of graduations which carry out the real-time display of the time-axis to the edit field shown in said user presentation step. In such a case, the synchronization with each time series data channel and a time-axis can be made easy to check visually.

[0047] Moreover, you may make it the edit field shown in said user presentation step equipped with one or more time stamp Rhine run to a lengthwise direction to show the applicable time of day specified by the time amount ruler. In such a case, on the basis of time stamp Rhine, the advance situation between each time series data channel is visually made a check, or it becomes easy to check visually the synchronization between each time series data channel.

[0048] Moreover, you may make it show an edit field equipped with current time stamp Rhine run to a lengthwise direction to show the current time on the time-axis specified by the time amount ruler at said user presentation step. In such a case, you may have further the step which moves this current time stamp Rhine to the location by which user actuation was carried out on the time amount ruler.

[0049] Moreover, you may have further the step which presents the viewing window which previews a motion of the multi-Seki nodal character object in current time.

[0050] Moreover, you may make it show an edit field equipped with the key frame channel for displaying each key frame or its thumbnail according to the time-axis which a time amount ruler specifies at said user presentation step. In such a case, the step which follows the key frame within a key frame channel or drag actuation of the thumbnail, and changes the time of day of a key frame may be included further. Moreover, the step which starts the pause edit display which answers the key frame within a key frame channel or own alternative actuation of the thumbnail, and edits the corresponding pause may be included further.

[0051] Moreover, you may make it show the edit field equipped with the motion channel for meeting the time-axis which a time amount ruler specifies, and editing and displaying the contents of the motion at said user presentation step. In such a case, each timing chart showing the serial actuation for every joint of a multi-Seki nodal character object is arranged to a lengthwise direction, and you may make it display a motion channel. Moreover, you may have further the step which changes actuation of the joint in the time

of day which follows and corresponds to the drag actuation on the timing chart within a motion channel.
[0052] Moreover, you may make it show the edit field equipped with the sound channel for displaying the contents of the sound along with the time-axis which a time amount ruler specifies at a user presentation step. Or you may make it show the edit field equipped with the display indicator channel for displaying the contents of the indicator indicative data along with the time-axis which a time amount ruler specifies at a user presentation step.
[0053] Moreover, the authoring approach may be further equipped with the step which displays the sound edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the sound.
[0054] The sound edit field may contain the score channel constituted by for example, a piano keyboard and the basic grid of time amount shaft orientations. In such a case, a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis, and a sound can be edited on this score channel by coloring a desired time-of-day list in the color which corresponds on the cel corresponding to a scale at a note. Moreover, the sound edit field may contain the velocity channel which displays the strength of the velocity for every sound along with a time-axis.
[0055] Moreover, the authoring approach may be further equipped with the step which displays the display indicator edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the indicator indicative data.
[0056] A display indicator edit field is constituted by the basic grid of the list of parts, and time amount shaft orientations which has arranged for example, the display indicator, and may contain the score channel. In such a case, at least each part can edit the score for every list on a score channel by displaying the lighting situation of the display indicator like each part on a time-axis.
[0057] Moreover, the authoring approach may be further equipped with the step which displays the preview window for checking visually action of the multi-Seki nodal character object generated based on each time series data edited in the time series data-editing step.
[0058] A motion of the multi-Seki nodal character object generated based on motion data may be displayed in three dimensions to 3D view field, or you may make it express the actuation of a display indicator based on an indicator indicative data as the step which displays this preview window on a display indicator actuation preview field synchronizing with the preview of other time series data.
[0059] Moreover, the authoring approach may be further equipped with the step which displays the pause window for editing the pause of a multi-Seki nodal character object by GUI actuation.
[0060] The stereo appointed field which this pause window displays a multi-Seki nodal character object on an expansion top view, and receives the own alternative of the part which can be edited, The part of a multi-Seki nodal character object which can be edited, and the list appointed field which displays the set point in a list, The setting part name of each part of a multi-Seki nodal character object which can be edited, the set point, the set point field that indicates the maximum by list at the minimum value list which can be set up, While carrying out 3D display of the whole body image of the multi-Seki nodal character object generated by 3D graphics, 3D viewing area which receives the own

alternative of the part which can be edited on this 3D display may be included.
[0061] Moreover, the authoring approach may be further equipped with the data input step which inputs from the outside the time series data which constitute action of a multi-Seki nodal character object. In such a case, you may make it display the pause generated based on the data inputted in said data input step on a pause window.
[0062] Moreover, the authoring approach may be further equipped with the step which displays the motion preview window which arranged one or more key frames which constitute a motion, or the thumbnail of those according to the time series at the time of motion playback.
[0063] Moreover, the 3rd side face of this invention It is the storage which stored physically the computer software described to perform processing for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data on computer system in the computer-readable format. The user presentation step which presents the edit field which put in order each time series data from which said computer software constitutes action synchronous along with the time-axis, It is the storage characterized by providing the time series data-editing step which creates or edits the time series data which correspond based on the user input through the edit field by said user presentation step prepared for each [which constitutes action] time series data of every.
[0064] The storage concerning the 3rd side face of this invention is a medium which offers computer software physically in a computer-readable format to the computer system of the versatility which can perform various program codes, for example. Attachment and detachment of CD (Compact Disc), FD (Floppy(trademark) Disc), MO (Magneto-Optical disc), etc., etc. are free for such a medium, and it is a storage of portability. Or it is also technically possible to provide specific computer system with computer software in a computer-readable format via transmission media, such as a network (for a network not to ask distinction of wireless and a cable), etc.
[0065] Such a storage defines the collaboration-relation on the structure of the computer software and the storage for realizing the function of computer software predetermined in a computer system top, or a function. If it puts in another way, by installing predetermined computer software in computer system through the storage concerning the 3rd side face of this invention, on computer system, a collaboration-operation is demonstrated and the same operation effectiveness as the authoring system and the authoring approach concerning each 1st [of this invention] and 2nd side faces can be acquired.
[0066] The purpose, the description, and advantage of further others of this invention will become [rather than] clear by detailed explanation based on the example and the drawing to attach of this invention mentioned later.
[0067]
[Embodiment of the Invention] Hereafter, the example of this invention is explained in detail, referring to a drawing.
[0068] A. The appearance configuration of the mobile robot 1 which performs the leg formula walk by the limbs with which operation is presented in this invention is shown in a robot's block diagram 1 . This robot 1 is a mobile robot of the multi-joint mold constituted by using as a model the configuration and structure of an animal of having the limbs as illustration. User actuation was answered and the mobile robot 1 of this example

can especially do an expression of operation while he has a side face of the pet mold robot designed by imitating the configuration and structure of a dog which are the example of representation of a pet, for example, coexists with human being in human being's living conditions.

[0069] A mobile robot 1 consists of, the idiosoma unit 2, a head unit 3, a tail 4, and Limbs 6A-6D, i.e., leg units.

[0070] The head unit 3 is arranged in the upper limit before abbreviation of the idiosoma unit 2 through the neck joint 7 with a roll, a pitch, and the degree of freedom of each shaft orientations (illustration) of a yaw. Moreover, the CCD (Charge Coupled Device: charge-coupled device) camera 15 equivalent to the "eye" of a dog, the microphone 16 equivalent to a "lug", the loudspeaker 17 equivalent to "opening", the touch sensor 18 equivalent to tactile feeling, and two or more LED indicators 19 are carried in the head unit 3. The sensor which constitutes a living body's senses besides these may be included.

[0071] The tail 4 is attached in the abbreviation Gokami edge of the idiosoma unit 2 free [a curve or rocking] through the tail joint 8 with the degree of freedom of a roll and a pitching axis.

[0072] The leg units 6A and 6B constitute a forefoot, and the leg units 6C and 6D constitute hind legs. Each leg units 6A-6D consist of combination of the femoral region units 9A-9D and the leg part units 10A-10D, and are attached in each corner of front and rear, right and left of the base of the idiosoma unit 2, respectively. The femoral region units 9A-9D are connected with each predetermined part of the idiosoma unit 2 by the hip joints 11A-11D with a roll, a pitch, and the degree of freedom of each shaft of a yaw. Moreover, it is connected by the knee joints 12A-12D with the degree of freedom of a roll and a pitching axis between the femoral region units 9A-9D and the leg part units 10A-10D.

[0073] the leg formula mobile robot 1 constituted like illustration making the head unit 3 shake vertically and horizontally by driving each joint actuator by the command from a control section mentioned later, or making a tail 4 wag **** -- each -- a foot -- Units 6A-6D -- a synchronization -- it is made to drive cooperatively and actuation of a walk, transit, etc. can be realized.

[0074] In addition, in fact, a mobile robot's 1 joint degree of freedom is arranged for every shaft, and is offered by the rotation drive of a joint actuator (not shown). Moreover, the number of the joint degree of freedom which the leg formula mobile robot 1 has is arbitrary, and does not limit the summary of this invention.

[0075] The block diagram of the electrical and electric equipment and control network of a mobile robot 1 is typically shown in drawing 2 . As shown in this drawing, a mobile robot 1 consists of the control section 20 which performs generalization-control of the whole actuation, and other data processing, the I/O section 40, a mechanical component 50, and a power supply section 60. Hereafter, each part is explained.

[0076] The I/O section 40 contains various kinds of sensors of CCD camera 15 which is equivalent to a mobile robot's 1 eyes as the input section, the microphone 16 equivalent to a lug, the touch sensor 18 equivalent to tactile feeling, or others equivalent to the senses. Moreover, the loudspeaker 17 equivalent to opening or LED indicator 19 which forms the expression of a face by the combination of flashing or the timing of lighting is equipped as the output section. These output section can express the user feedback from a mobile robot 1 in the form of [other than a machine movement pattern with a foot etc.].

[0077] A mobile robot 1 can recognize the objective configuration and the color of arbitration which exist on workspace by a camera 15 being included. Moreover, the mobile robot 1 may have further the receiving set which receives dispatch waves other than a vision means like a camera, such as infrared radiation, an acoustic wave, a supersonic wave, and an electric wave. In this case, based on the sensor output which detects each carrier wave, the location and sense from the source of dispatch are measurable.

[0078] A mechanical component 50 is functional block which realizes machine movement of a mobile robot 1 according to the predetermined movement pattern which a control section 20 orders it, and consists of drive units prepared for every shafts, such as a roll in each joint, such as the neck joint 7, the tail joint 8, hip joints 11A-11D, and knee joints 12A-12D, a pitch, and a yaw. A mobile robot 1 has the joint degree of freedom of n pieces, therefore a mechanical component 50 is constituted from the example of illustration by n drive units. Each drive unit consists of combination of the driver 53 which controls the rotation location and rotational speed of a motor 51 accommodative based on the output of the motor 51 which performs rotation actuation of the circumference of a predetermined shaft, the encoder 52 which detects the rotation location of a motor 51, and an encoder 52.

[0079] A power supply section 60 is a functional module which supplies electric power to each electrical circuit in literal [the] and a mobile robot 1 etc. The mobile robot 1 concerning this example is the autonomous drive type which used the dc-battery, and a power supply section 60 consists of a charge dc-battery 61 and a charge-and-discharge control section 62 which manages the charge-and-discharge condition of the charge dc-battery 61.

[0080] The charge dc-battery 61 consists of gestalten of the "battery pack" which package-ized two or more nickel cadmium battery cels to the cartridge-type.

[0081] Moreover, the charge-and-discharge control section 62 grasps the remaining capacity of a dc-battery 61 by measuring the terminal voltage of a dc-battery 61, charge/strength of discharge current, the ambient temperature of a dc-battery 61, etc., and determines an initiation stage, a termination stage, etc. of charge. The initiation and the termination stage of charge which the charge-and-discharge control section 62 determines are notified to a control section 20, and serve as a trigger for a mobile robot 1 to start and end charge operation.

[0082] A control section 20 is equivalent to "brains", for example, is carried in a mobile robot's 1 head unit 3 or idiosoma unit 2.

[0083] The configuration of a control section 20 is further illustrated in the detail at drawing 3 . As shown in this drawing, the control section 20 has the composition that the bus connection of CPU (Central Processing Unit)21 as a Maine controller was carried out to each circuit component, which are memory and others, or a peripheral device. A bus 27 is a common signal-transmission way containing a data bus, an address bus, a control bus, etc. The address (a memory address or I/O Address) of a proper is assigned at each to each equipment on a bus 27, and CPU21 can communicate with the specific equipment on a bus 28 by addressing.

[0084] RAM (Random Access Memory)22 is the memory which consisted of volatile memory, such as DRAM (Dynamic RAM), and which can be written in, loads the program code which CPU21 performs, or is used for temporary preservation of the

activity data based on an executive program.
[0085] ROM (Read Only Memory)23 is a read-only memory which stores a program and data everlastingly. The self-test test program performed to a mobile robot's 1 power up, the control program of operation which specifies actuation of a mobile robot 1 are mentioned to the program code stored in ROM23.
[0086] The "sensor input-process program" which processes sensor inputs, such as a camera 15 and a microphone 16, the "action instruction program" which generates a mobile robot's 1 action, i.e., a movement pattern, based on a sensor input and a predetermined model of operation, and the "drive control program" etc. which controls the drive of each motor, the voice output of a loudspeaker 17, etc. according to the generated movement pattern are contained in a robot's 1 control program. High actuation of entertainment nature, such as a "hand", a "rain check", "stability", and utterance of the cry of animals, such as "one one", may be included in the movement pattern generated in addition to usual locomotion and usual transit movement.
[0087] Moreover, creation and various kinds of edited operating-sequence programs are included, using an authoring tool as a control program of others of a robot 1. An authoring tool is started under a software execution environment predetermined in the computer system top installed for example, in the robot 1 exterior. However, it explains in detail to the program created and edited by the authoring tool list on this tool, therefore the back.
[0088] Like EEPROM (Electrically Erasable and Programmable ROM), nonvolatile memory 24 consists of memory devices in which elimination re-writing is possible electrically, and it is used in order to hold the data which should be updated serially in un-volatilizing. Security information, such as a serial number and a cryptographic key, the various models which specify a mobile robot's 1 behavior pattern are mentioned to the data which should be updated serially.
[0089] An interface 25 is equipment for interconnecting with the device besides a control section 20, and making the data exchange possible. An interface 25 performs data I/O between a camera 15, a microphone 16, and a loudspeaker 17. Moreover, an interface 25 is each driver 53-1 in a mechanical component 50. -- I/O of data or a command is performed in between.
[0090] An interface 25 Moreover, serial interface, such as RS(Recommended Standard)-232C, Parallel interfaces, such as IEEE (Institute of Electrical and electronics Engineers)1284, A USB (Universal Serial Bus) interface, An i-Link (IEEE1394) interface, a SCSI (Small Computer System Interface) interface, It has a general interface for peripheral-device connection of computers, such as a memory card interface, and may be made to perform program and migration of data between the external instruments by which local connection was made.
[0091] Moreover, as other examples of an interface 25, it has an infrared-ray-communication (IrDA) interface, and may be made to perform an external instrument and radio.
[0092] Furthermore, a control section 20 can perform an external host computer 100 and data communication via contiguity radio as shown in "bluetooth" or ".11B" or LAN (Local Area Network: (trademark), for example, Ethernet), or the Internet including radio interface 26 Network Interface Card (NIC) 27. As for the transceiver section for radio, it is desirable from a viewpoint of receiving sensibility to be installed in the point of

mobile-robot 1 bodies, such as the head unit 2 and a tail 3.
[0093] One purpose of the data communication between such a mobile robot 1 and a host computer 100 is calculating a mobile robot's 1 complicated motion control, or operating by remote control using the computer resource of the robot 1 exterior (namely, remoteness).
[0094] Moreover, other purposes of this data communication are to supply data and program of the robots 1, such as a model of operation and other program codes, required for motion control to a mobile robot 1 from the equipment of a network course and remoteness.
[0095] Moreover, other purposes of this data communication are debugging processings of the real time according using an authoring tool (after-mentioned) to collaboration-actuation with download of the program for creation and the robot motion control which edited, the host computer 100 of such a program for motion control, and a robot 1 on a host computer 100.
 [0096] Moreover, other purposes of this data communication are transmitting the set points of operation, such as include-angle data of each joint actuator with which an operator's specifies the pause which carried out direct teaching to the mobile robot 1, to a host computer 100 side. On a host computer 100, the "pause" specified by the include-angle data of such each joint actuator can be edited on a pause window, and the key frame for a motion can be created. In short, the pause supplied by the mobile robot 1 is applicable to edit of action (after-mentioned).
[0097] A control section 20 may be equipped with the keyboard 29 which consists of a ten key and/or an alphabet key. A keyboard 29 is used in a robot's 1 work site for command input with a direct user, and also it is used for the input of owner authentication information, such as a password.
[0098] The mobile robot 1 concerning this example can perform autonomous (that is, a help does not intervene) actuation, when a control section 20 performs a predetermined control program of operation. Moreover, while having an input unit equivalent to the senses of human beings, such as an image input (namely, camera 15), voice input (namely, microphone 16), and a touch sensor 18, or an animal, it has the intelligence which performs reasonable or emotional action which answered these external inputs.
[0099] The mobile robot 1 constituted as shown in drawing 1 - drawing 3 has the following descriptions. Namely, [0100] (1) When changing from a certain posture to other postures is directed, between each posture cannot be changed directly but it can change via an in-between posture without the unreasonableness prepared beforehand.
(2) A notice can be received when the posture of arbitration is reached by posture transition. (3) Attitude control can be carried out, managing a posture independently in each unit unit, such as a head, a foot, and the tail section. Namely, apart from the whole robot's 1 posture, a posture is manageable for every unit.
(4) A parameter to show the detail of actuation of an instruction of operation can be passed.
[0101] As shown in drawing 3 , the mobile robot 1 concerning this example interconnects with the external host computer 100 via the network. Or the means of communications of radio (for example, bluetooth and .11B short distance wireless data transmission) or others may connect in the host computer 100.
[0102] On a host computer 100, a predetermined software execution environment is built, under this environment, an authoring tool can be started, and a robot's 1 operating

sequence can be created and edited comparatively easily and efficiently by interactive processing. However, about the detail of an authoring tool, it mentions later.
[0103] In drawing 4 , the example of a hardware configuration of a host computer 100 is illustrated typically. Hereafter, each part in a computer 100 is explained.
[0104] CPU (Central Processing Unit)101 which is the Maine controller of a system 100 performs various kinds of applications under control of an operating system (OS). Although OS offers the GUI (Graphical User Interface) environment more preferably, it is good at Windows 98 [UNIX (trademark) or] of U.S. Microsoft/NT, for example.
[0105] CPU101 interconnects with other equipments (after-mentioned) by bus 107 as illustration. The memory address or I/O Address of a proper is given to each device on a bus 107, respectively, and device access is possible for CPU101 by these addresses. Although buses 107 are a data bus, an address bus, and a common signal-transmission way containing a control bus, the example is a PCI (Peripheral Component Interconnect) bus.
[0106] Memory 102 is storage used since the program code performed in a processor 101 is stored or the activity data under activation are stored temporarily. Please understand the memory 102 shown in this drawing to be a thing containing both un-volatilizing and volatilization memory.
[0107] The display controller 103 is an exclusive controller for actually processing the drawing instruction which CPU101 publishes, for example, supports a bit map drawing function equivalent to SVGA (Super Video Graphic Array) or XGA (eXtended Graphic Array). Once it is written in a frame buffer (not shown), the screen output of the drawing data processed in the display controller 103 is carried out at a display 111. Indicating equipments 111 are for example, a CRT (Cathode Ray Tube) display, a liquid crystal display display (Liquid Crystal Display), etc.
[0108] The input device interface 104 is equipment for connecting user input devices, such as a keyboard 112 and a mouse 113, to a system 100. The input device interface 104 answers the coordinate directions input through the key input or mouse 113 by the keyboard 112, and generates interruption to CPU101.
[0109] According to predetermined communications protocols, such as Ethernet, it can connect with networks, such as LAN (Local Area Network), or the network interface 105 can connect a system 100 to short-distance wireless data transmission like bluetooth or .11B. Generally, the network interface 105 is offered with the gestalt of a LAN adapter card, and the PCI bus slot on a mother board (not shown) equips with it, and it is used.
[0110] In the example shown in drawing 3 , although the host computer 100 interconnects with the robot 1 via wireless data transmission or a network, of course, both may be connected by other means of communications and data migration means. For example, it may be made to perform exchange and migration of data through an archive medium like memory card (memory stick).
[0111] Moreover, on the network, two or more host computers (not shown) are connected in the transparent condition, and the distributed computing environment is built. Distribution of a software program, data contents, etc. is performed on a network. For example, the authoring tool concerning this example, the action sequence program for robots (the action file which serves as an action sequence further, a motion file, a sound file, LED actuation file) created and edited by this authoring tool can be distributed via a network. Moreover, network distribution service of such a program/data may be offered

the charge or for nothing.
[0112] The external instrument interface 106 is equipment for connecting external devices, such as a hard disk drive (HDD) 114 and the media drive 115, to a system 100. The external instrument interface 106 is based on interface specification, such as IDE (Integrated Drive Electronics) and SCSI (Small Computer System Interface).
[0113] HDD114 is the external storage which carried the magnetic disk as storage support fixed (common knowledge), and excels other external storage in points, such as memory capacity and a data transfer rate. It calls it "install" to the system of a program to place on HDD116 in the condition that a software program can be performed. Usually, the program code of the operating system which a processor 511 should perform, an application program, a device driver, etc. are stored in HDD114 in un-volatilizing. For example, creation and the edited action sequence program for robots are installable on HDD114 using the authoring tool concerning this example, and this authoring tool.
[0114] Moreover, the media drive 115 is equipment for loading with portable mold media, such as CD (Compact Disc), and MO (Magneto-Optical disc), DVD (Digital Versatile Disc), and accessing a data-logging side. Portable mold media are used in order to mainly move backing up a software program, a data file, etc. as data of a computer-readable format, and these between systems (that is, sale, circulation, and distribution are included). For example, these portable mold media can be used, and the authoring tool concerning this example, the action sequence program for robots (the action file which serves as an action sequence further, a motion file, a sound file, LED actuation file) created using this authoring tool can be physically circulated and distributed between devices.
[0115] In addition, an example of the host computer 100 as shown in drawing 4 is the compatible machine or succeeding machine of personal computer"PC/AT(Personal Computer/Advanced Technology)" of U.S. IBM. Of course, it is also possible to apply the computing system equipped with other architecture as a host computer 100 concerning this example.
[0116] B. In configuration this example of an authoring system, creation and edit of the control program of operation which consists of a series of command/data which describe a robot's 1 predetermined pattern of operation can be done using the authoring tool started on the host computer 100. Moreover, creation and the edited control program of operation are transmitted to a robot 1 side using radio means, such as bluetooth and .11B, using this authoring tool, and collaboration-actuation with a host computer 100 and a robot 1 performs debugging processing. That is, the authoring system for supporting creation and edit of a mobile robot's 1 control program of operation is built by organic association between a host computer 100 and a robot 1.
[0117] In drawing 5 , the whole authoring system configuration is illustrated typically.
[0118] In a host computer 100 side, a user can use the GUI (Graphical User Interface) screen which an authoring tool offers, and can create and edit the scenario of a convention of a mobile robot 1 by mouse actuation. About the detail of the editing operation on this GUI screen, it mentions later in the GUI screen list for scenario creation. Or a user can use the usual text editor etc., and can create and edit a robot's 1 control program of operation in a script format (for example, high level language formats, such as C).
[0119] An authoring tool changes the scenario which the user created and edited on the

GUI screen, and the control program of the script format created and edited on the text editor of operation into the mnemonic code of a format similar to the assembler called "RCODE".

[0120] RCODE said here is the programming language upon which it was decided in order to control a robot 1 by the easy command, and since it also has fundamental control structures, such as "IF" and "GO", it can be used also as a minimum level script language for robot controls.

[0121] The RCODE actuation control program created and edited on the host computer 100 is movable to a robot 1 side using media, such as a memory stick. Moreover, at the time of debugging of a RCODE actuation control program, a RCODE program is taken out for every line, and it enciphers, and transmits to a robot 1 side serially using radio means, such as bluetooth and .11B.

[0122] On the other hand, in the robot 1 side, it has an interpreter/debugger, middleware, the driver, and the operating system (OS) as activation and the debugging environment of the control program of operation described by RCODE etc.

[0123] An interpreter is a high-level-language program which reads at a time the program of one line described in the RCODE format, interprets it, and performs it. However, in the time of debugging etc., when a RCODE program is transmitted in the format enciphered from the host computer 100 side, once an interpreter decrypts this, it needs to perform interpretation and activation.

[0124] A debugger discovers the error in a RCODE program (bug), and is a program which supports the activity which corrects. That is, according to the debugger, activation can be stopped in the line which specified the program, or the memory at that time and the contents of the variable can be referred to.

[0125] Middleware is an assembly of a software module which offers a robot's 1 fundamental function, and the configuration of each module is influenced of hardware attributes, such as a robot's 1 mechanical and electric property and specification, and a configuration. Middleware is functionally divided roughly into the middleware of a recognition system, and the middleware of an output system.

[0126] The middleware of a recognition system is an engine which receives raw data from hardware, such as image data, voice data, and detection data obtained from other sensors, via a virtual robot, and processes these. That is, based on various input, speech recognition, distance detection, posture detection, contact, motion detection, color recognition, etc. are processed, and a recognition result is obtained. A recognition result is notified to the application layer (action sequence program) of a high order.

[0127] On the other hand, in the middleware of an output system, functions, such as a walk, playback of a motion, composition of an output sound, and flashing control of a LED indicator, are offered. That is, the action plan drawn up in the application layer is received, the servo command value of each joint of a robot, an output sound, output light (LED), output voice, etc. are generated for every function of a robot 1, and it demonstrates on a robot 1.

[0128] A driver is a program code for operating hardware of each joint actuator or others.

[0129] In this example, the driver is mounted in the middleware list by the object-oriented program. The software based on object-oriented is fundamentally treated in the module unit of the "object" which made the processing procedure over data and its data unify. Moreover, if needed, two or more objects are created or one software is completed

by combining. Generally, according to the object oriented programming, it is thought that the efficiency of development and maintenance of software is increased.
[0130] An operating system (OS) performs control about management of the data communication between these objects, and other program executions. OS is also mounted by the object-oriented program.
[0131] C. The scenario of operation created using the authoring tool concerning creation / edit this example of the program for robots of operation using an authoring tool is realized in creation and edit of "behavior", and creation and edit of "action", and the result object is called a "project." Hardware Configuration Information which consists of combination of physical components, such as a mobile robot's 1 configuration (CPC:Configured Peripheral Component), i.e., a fuselage, a head, and the leg, is set to the project.
[0132] A project consists of a behavior file, an action file, a motion file, a sound file, and an LED actuation file. Behavior is constituted by the combination of action. Moreover, action uses each contents, such as a motion, a sound, and LED actuation, as a component.
[0133] A motion file is a file which specifies actuation of each joint actuator of a mobile robot 1. By this example, by arranging serially two or more key frames which described signs that the mobile robot 1 was made to take a desired pause on the GUI edit display can prescribe a motion. However, about the editing task of the motion on a GUI edit display, it explains in detail behind.
[0134] A sound file is sound data for carrying out a voice output through a loudspeaker 17, for example, is constituted as a file of MIDI (Musical Instrumental Digital Interface) or a WAVE format. For example, the sound file described in the MIDI format is not as information on the sound itself, performance information, such as magnitude, die length, a tone, and effectiveness, is changed into numeric data, and music is expressed. Although performance information can be edited in this example by operating each numeric data of the MIDI format which constitutes sound through a GUI edit display, about this point, it explains in detail behind.
[0135] An LED actuation file is data for specifying the combination of lighting of two or more LED indicators 19, and the timing of flashing, and is used for the purpose of forming the expression of a face. In this example, an LED actuation file can be described in a MIDI format, and can edit an LED actuation file now free through a GUI edit display. However, about the editing task on a GUI edit display, it explains in detail behind.
[0136] A motion, a sound, and LED actuation are the components of action, and are time series data which change according to the passage of time. In order to reproduce action correctly, each [these] component must synchronize in time. Although each file can be edited on a GUI edit display in this example so that lighting of a motion, a sound, and LED may synchronize on a time-axis mutually, about this point, it explains in detail behind.
[0137] Action is constituted by unifying each contents called the motion file and sound file by which the synchronization was taken on the time-axis, and an LED actuation file. One action file is a command (it is also called "semantics") reproduced in general in about 10 seconds. In this example, the work environment for the action edit which can take the synchronization between each contents to preparation is offered by using the time line on a GUI edit display so that it may mention later. Moreover, each contents can

be processed as each data, and also it can treat the format, i.e., in the form of action, unified with other contents.

[0138] Behavior is a file which is constituted by putting two or more commands, i.e., action, in order and which specifies behavior of a mobile robot 1. Action is reproduced from a start to an end in an one direction. On the other hand, behavior can specify the sequence which reproduces action. Furthermore, it can box-ize, branching based on conditions or a probability, and two or more commands, i.e., action, and a subroutine can be defined. Therefore, behavior can be compared with action and can describe a mobile robot's 1 complicated action sequence with altitude more.

[0139] The functional configuration of an authoring system is typically shown in drawing 29 . As shown in this drawing, especially the authoring system concerning this example is designed for [of action] edits, and consists of the action editorial department, the key frame editorial department, the motion editorial department, the sound editorial department, the LED actuation editorial department, and a user interface control section that realizes the editing task of the user by each [these] functional module by the dialogic operation by the GUI screen.

[0140] The action editorial department is a functional module for editing a motion file, a sound file, and an LED actuation file in the format that a synchronization is taken on a time-axis. The action editorial department shows a user the action edit window for setting up the timing of the joint actuation (motion) in alignment with a mobile robot's 1 time-axis, and a sound and LED actuation through a user interface control section. Although the action edit window is equipped with the edit field which consists of a table of the time-line format for setting up various kinds of files on a time-axis, it is yielded to the after-mentioned about the detail of an action edit window.

[0141] The key frame editorial department is a functional module for editing the image frame which described the pause in the time of day when the mobile robot which performs a key frame, i.e., a motion, corresponds. The key frame editorial department is answered and called to the user actuation to the action editorial department, and the editing task by the user is received through the key frame channel opened on an action edit window. Although the thumbnail showing a key frame is put on each location where it corresponds on a time-axis by the key frame channel, the after-mentioned is yielded about the detail of a key frame channel.

[0142] The motion editorial department is a functional module for editing serial actuation of each joint actuator which constitutes a motion, i.e., a mobile robot. The motion editorial department is answered and called to the user actuation to the action editorial department, and the editing task by the user is received through the motion channel opened on an action edit window. Although each timing chart which describes serial actuation of each joint actuator is listed in the shape of a tree by the motion channel according to biomodel (tree view), the after-mentioned is yielded about the detail of a motion channel.

[0143] Moreover, the motion editorial department shows a user the pause window for editing a mobile robot's 1 pause, and the motion pre viewer for previewing the finished motion through the user interface section on 3D display screen. The after-mentioned is yielded about the detail of a pause window or a motion pre viewer.

[0144] The sound editorial department is a functional module for setting up the detail of the sound which is one of the components of action. In this example, a sound is treated in

a MIDI format or a WAVE format. The sound editorial department shows a user the sound detail window for setting up the detail of a sound along a time-axis top through a user interface control section. The sound detail window is equipped with the edit field which consists of a table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. However, the after-mentioned is yielded about the detail of a sound detail window. The contents set up on the sound detail window are used for the display on the sound channel in an action edit window (after-mentioned).

[0145] The LED actuation editorial department is a functional module for setting up the detail of the LED actuation which is one of the components of action. In this example, LED actuation is treated in a MIDI format. The LED actuation editorial department shows a user the LED detail window for setting up the detail of LED actuation along a time-axis top through a user interface control section. Although the LED detail window is equipped with the edit field which consists of a table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction, it is yielded to the after-mentioned about the detail of an LED detail window. The contents set up on the LED detail window are used for the display on the LED actuation channel in an action edit window (after-mentioned).

[0146] A user interface control section shows a user a project window at the time of project edit.

[0147] Moreover, a user interface control section answers the user directions through each edit window, and can access now each file system (or database) which manages a behavior file, an action file, a motion file, a sound file, and an LED actuation file.

[0148] Subsequently, it explains in detail on the authoring system concerning this example about procedure for a user to create and edit a mobile robot's 1 scenario of operation.

[0149] At the time of project edit, a "project window" as shown in drawing 6 is displayed. A project window contains a list viewing area with a title bar, a menu bar, and a tool bar. A project window is constituted as for example, a SDI (Single Document Interface) Maine window. (SDI is the user interface of a type which opened one document in one window.)

[0150] In a project window, the list of each files, such as a behavior file used for edit of action, an action file, a motion file, a sound file, and an LED actuation file, is displayed on the edit list of behavior in a tree format as illustration.

[0151] If the item on the list of behavior and action is double-clicked, the corresponding edit window (refer to drawing 9 in the below-mentioned list) will open. Moreover, if the thumbnail of a motion is double-clicked, a motion preview window (refer to drawing 28 in the below-mentioned list) will open.

[0152] A project window has the function which displays the detailed information about the item which is on a tree list and was chosen.

[0153] A thumbnail, a file name, provisions of classification, easy explanation of operation, the operating time, etc. are included in the detailed information about behavior. A thumbnail (initial pause), a file name, the operating time, an initial pause, a termination pause, file capacity, etc. are contained in the detailed information about action. A thumbnail (initial pause), a file name, the operating time, an initial pause, a termination pause, file capacity, etc. are contained in the detailed information about a motion. A

thumbnail (icon showing a sound), a file name, the operating time, file capacity, etc. are contained in the detailed information about a sound. A thumbnail (icon showing LED actuation), a file name, the operating time, file capacity, etc. are contained in the detailed information about LED actuation.

[0154] Moreover, the menu bar containing each menu a "file", "edit", a "material", and "a help" is prepared above the project window.

[0155] If a menu "a file" is chosen, the pull down menu which becomes a "new project", "a project being opened", "project preservation", "project new preservation", and a list from each sub menu "termination" further will appear (refer to drawing 7).

[0156] Selection of a sub menu "a new project" generates a new project. When the non-saved project is already opened, the dialog which carries out the prompt of the check of whether to save the project to a user appears.

[0157] Selection of a sub menu "a project is opened" opens the existing project file. When the non-saved project is already opened, the dialog which carries out the prompt of the check of whether to save the project to a user appears (same as the above).

[0158] Selection of a sub menu "project preservation" overwrites the corresponding project file. In the case of a non-permanent file, like project new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.

[0159] If a sub menu "project new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.

[0160] Selection of a sub menu "termination" closes this project window. When the project file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.

[0161] Moreover, if a menu "a material" is chosen, the pull down menu which becomes "new behavior creation", "new action creation", "material reading", and a list from each sub menu "material deletion" further will appear (refer to drawing 8).

[0162] If a sub menu "new behavior creation" is chosen, it will open in the condition that a behavior edit window is new. The behavior is automatically added to the list of the behavior in a project window. since behavior edit is not related directly, it is not explained to be the summary of this invention any more by this detail letter.

[0163] If a sub menu "new action creation" is chosen, it will open in the condition that an action edit window (refer to drawing 9 in the below-mentioned list) is new. The action is automatically added to the list of action in a project window.

[0164] If a sub menu "material reading" is chosen, a file designation dialog will appear and an available material file will be registered into a project. It is the same as that of the case where drag-and-drop actuation is carried out from Explorer.

[0165] Only when a sub menu "material deletion" is chosen and an item is in a selection condition, it becomes an effective display, and if chosen, the item will be deleted from the list of [in a project window]. However, a file is not necessarily deleted from a directory.

[0166] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."

[0167] Moreover, the tool carbon button for calling often used functions, such as a new behavior creation carbon button (New Behavior), a new action creation carbon button (New Action), and a garbage can (Trash), in an instant is arranged in the lower part of a

menu bar.
[0168] A new behavior creation carbon button is equivalent to the sub menu "new behavior creation" in a menu "a material." Moreover, a new action creation carbon button is equivalent to the sub menu "new action creation" in a menu "a material." Moreover, a garbage can is equivalent to the sub menu "material deletion" in a menu "a material."
[0169] In the project window, the so-called drag-and-drop actuation is permitted. That is, drag actuation can be carried out and the file icon on Explorer can be directly registered into the location of the request on a tree.
[0170] Moreover, drag actuation of the material on a tree list can also be carried out in each edit window. Action can be dragged to a behavior window. Moreover, a motion, a sound, and LED actuation can be dragged to an action window.
[0171] The configuration of an action edit window is roughly shown in drawing 9 . On this action edit window, the timing of the joint actuation (motion) in alignment with a mobile robot's 1 time-axis, and a sound and LED actuation can be set up. The edit result in this edit window is saved as an action file with extension "act". In addition, in the case of an authoring system which is preparing the action edit window which changes with differences (or difference of Hardware Configuration Information which consists of combination of a CPC component) of a mobile robot's 1 model, you may constitute so that an action edit window may change according to the model-selection actuation by the user.
[0172] An action edit window consists of a title bar, a menu bar, and an edit field that sets up motion data, sound data, and LED actuation data on a time-axis as illustration.
[0173] Each menu a "file", a "material", and "a help" is prepared for the menu bar.
[0174] If a menu "a file" is chosen, the pull down menu which becomes "new action", "action being opened", "action preservation", "action new preservation", "system playback", and a list from each sub menu of "closing" further will appear (refer to drawing 10).
[0175] Selection of a sub menu "new action" generates new action. When non-saved action is already opened, the dialog which carries out the prompt of the check of whether to save the action to a user appears.
[0176] Selection of a sub menu "action is opened" opens the existing action file. When non-saved action is already opened, the dialog which carries out the prompt of the check of whether to save the action to a user appears (same as the above).
[0177] Selection of a sub menu "action preservation" overwrites the corresponding action file. In the case of a non-permanent file, like action new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.
[0178] If a sub menu "action new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0179] If a sub menu "system playback" is chosen, the action file edited on the action edit window shown in drawing 9 will be transmitted to the system 1, i.e., a mobile robot, and playback actuation will be tried actually. An action file may be transmitted to a mobile robot 1 through short-distance wireless data transmission like Bluetooth, or may move between equipment through media like memory card (memory stick).
[0180] Selection of a sub menu "it closes" closes this action edit window. When the action file in this window has not been saved, a dialog appears and the prompt of the

check of whether to save this is carried out to a user.
[0181] When a menu "edit" is chosen, further Moreover, "it returns", "cutoff", A "motion copy", a "sound copy", "LED copy", "overwrite attachment", The pull down menu which becomes "insertion attachment", "deletion", "key-frame-izing", "frame insertion", "assignment frame number insertion", "frame deletion", and a list from each sub menu "assignment frame deletion" appears (refer to drawing 11).
[0182] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0183] If a sub menu "cutoff" is chosen, when there is selected time amount width of face and there are not a motion in the range and time amount width of face, the motion of the frame, a sound, and LED actuation will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is not lost but the information about the contents of the frame of it is lost.
[0184] When a sub menu "a motion copy" is chosen and there is selected time amount width of face, the motion in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0185] When a sub menu "a sound copy" is chosen and there is selected time amount width of face, the sound in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0186] When a sub menu "an LED copy" is chosen and there is selected time amount width of face, LED actuation in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0187] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0188] Selection of a sub menu "insertion attachment" carries out the insertion paste of the contents currently kept in the clipboard at current time of day.
[0189] If a sub menu "deletion" is chosen, when there is selected time amount width of face, the motion in the range is deleted, and when there is no time amount width of face, the motion of the frame, a sound, and LED actuation, i.e., action of the frame, will be deleted.
[0190] Selection of a sub menu "key-frame-izing" key-frame-izes the frame of current time of day. That is, the pause interpolated between the existing key frames can be generated, and this can be made into new key frame data.
[0191] If a sub menu "frame insertion" is chosen, when there is selected time amount width of face, the frame for the time amount will be inserted in current time of day by the frame. The whole action time amount will be extended by only insertion frame time as a result of this frame insertion actuation.
[0192] If a sub menu "assignment frame number insertion" is chosen, the dialog of a numerical input will appear and the frame for a numeric value inputted on this dialog will be inserted. The unit of the numeric value to input is considered as time amount assignment. The whole action time amount will be prolonged by only assignment frame time as a result which performs insertion actuation of this assignment frame number.
[0193] If a sub menu "frame deletion" is chosen, when there is selected time amount width of face, the frame for the time amount will be deleted from current time of day. Under the present circumstances, the frame which was in the left in the edit field is packed. As a result of this frame deletion actuation, the whole action time amount of

deletion frame time will shrink.
[0194] If a sub menu "assignment frame deletion" is chosen, the dialog of a numerical input will appear and the frame for a numeric value inputted on this dialog will be deleted. The unit of the numeric value to input is considered as time amount assignment. Under the present circumstances, the frame which was in the left in the edit field is packed. As a result of this assignment frame deletion actuation, the whole action time amount of assignment frame time will shrink.
[0195] Moreover, if a menu "a material" is chosen, the pull down menu which becomes "reading of a motion", "the beginning of a motion", "reading of a sound", "the beginning of a sound", "reading of LED", and a list from each sub menu "the beginning of LED" further will appear (refer to drawing 12).
[0196] If a sub menu "reading of a motion" is chosen, it will read from the storing location (for example, local disk) which specified the motion file, and will insert in the current time of day on the motion channel in an edit field (after-mentioned). The key frame contained in a motion file turns into a key frame as it is in the case of this reading processing.
[0197] Selection of a sub menu "the beginning of a motion" saves the motion of the selected time amount width of face in the storing location (for example, local disk) specified as a motion file.
[0198] If a sub menu "reading of a sound" is chosen, it will read from the storing location (for example, local disk) which specified the sound file, and will insert in the current time of day on the sound channel in an edit field (after-mentioned).
[0199] Selection of a sub menu "the beginning of a sound" saves the sound of the selected time amount width of face in the storing location (for example, local disk) specified as a sound file of for example, a MIDI format.
[0200] If a sub menu "reading of LED" is chosen, it will read from the storing location (for example, local disk) which specified the LED actuation file, and will insert in the current time of day on the LED channel in an edit field (after-mentioned).
[0201] Selection of a sub menu "the beginning of LED" saves LED actuation of the selected time amount width of face in the storing location (for example, local disk) specified as an LED file of for example, a MIDI format.
[0202] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0203] It returns to drawing 9 again and the edit field of an action edit window is explained. The edit field of an action edit window is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction as illustration. In a time-line table, it consists of a time amount ruler, a key frame channel, a motion channel, a sound channel, and an LED actuation channel.
[0204] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 9). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. The relation between the real time in a real-time display and the display of a time amount ruler is illustrated below.
[0205]
[Equation 1]
00:00 = 0 second 05:23 = 5 second 2313:87 = 13 second 87[0206] Moreover, the unit of

the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0207] A width-of-face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) is carried out as follows at a list at the time of a real-time display (however, a unit is set to sec).
[0208]
[Table 1]
実時間表示時

設定値（表示）	表示可能秒数	目盛数字	補助目盛
1frame=0.5 pixel (0.5px/fr)	約 20.12 秒	02:00 (62.5px 毎)	00:20 (6.25px 毎)
1frame=1pixel (1px/fr)	約 10.24 秒	01:00 (62.5px 毎)	00:10 (6.25px 毎)
1frame=2pixel (2px/fr)	約 5.12 秒	01:00 (125px 毎)	00:10 (12.5px 毎)
1frame=3pixel (3px/fr)	約 3.41 秒	00:50 (93.75px 毎)	00:05 (9.375px 毎)
1frame=4pixel (4px/fr)	約 2.56 秒	00:50 (125px 毎)	00:05 (12.5px 毎)
1frame=6pixel (6px/fr)	約 1.7 秒	00:25 (93.75px 毎)	00:025 (9.375px 毎)
1frame=8pixel (8px/fr)	約 1.28 秒	00:25 (125px 毎)	00:025 (12.5px 毎)

[0209]
[Table 2]
フレーム数表示時

設定値（表示）	表示可能秒数	目盛数字	補助目盛
1frame=0.5 pixel (0.5px/fr)	約 20.12 秒	200 (100px 毎)	20 (10px 毎)
1frame=1pixel (1px/fr)	約 10.24 秒	100 (100px 毎)	10 (100px 毎)
1frame=2pixel (2px/fr)	約 5.12 秒	50 (100px 毎)	5 (10px 毎)
1frame=3pixel (3px/fr)	約 3.41 秒	25 (75px 毎)	2.5 (7px 毎)
1frame=4pixel (4px/fr)	約 2.56 秒	25 (100px 毎)	2.5 (10px 毎)
1frame=6pixel (6px/fr)	約 1.7 秒	10 (60px 毎)	5 (6px 毎)
1frame=8pixel (8px/fr)	約 1.28 秒	10 (80px 毎)	1 (8px 毎)

[0210] However, the number of seconds which is said here and which can be displayed is the near number of seconds which can be displayed at the time of the maximization window of the display corresponding to SVGA (Super Video Graphic Array). Moreover,

a time amount ruler scrolls appropriately by scrolling (actuation of a horizontal-scrolling bar) of a time-axis.
[0211] The time amount ruler includes the end time field and the current time stamp field other than a unit change radio carbon button.
[0212] The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.
[0213] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (neither is illustrated) for changing the "last pause assignment pop up menu" for specifying the "initial pause assignment pop up menu" for specifying an initial pause and the last pause and spacing of a time amount ruler can be called.
[0214] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively.
[0215] Key frame Rhine which shows the time of day of each key frame (after-mentioned) is made to be displayed in the form which crosses each channel top. Therefore, a user can perform an editing task, checking the synchronization between a motion, a sound, and LED actuation visually.
[0216] Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. End time Rhine can also be caught with last pause key frame Rhine.
[0217] Moreover, he is trying for current time-of-day Rhine which shows current time to display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current time of day to the location.
[0218] When the preview window (not shown) is open in the edit field, a mobile robot's 1 three-dimension image in current time of day is always displayed. An authoring system 1 generates automatically the interpolation frame equivalent to current time of day, and such a three-dimension image is acquired by performing image processings, such as coordinate transformation, based on actuation of each joint actuator at that time etc.
[0219] A key frame channel is a field for displaying a key frame according to the time-axis which a time amount ruler specifies.
[0220] In this example, switching operation is possible for a key frame channel. The action edit window in the condition (key frame detail channel) of having opened the key frame channel is shown in drawing 13 . By the key frame channel, the thumbnail showing a key frame is put on each location where it corresponds on a time-axis. The "key frame" said here is an image frame which described the pause in the time of day when the mobile robot which performs a motion corresponds.
[0221] An initial pause and the last pause are special key frames located in the start of a key frame channel, and an end, respectively. The key frame of the beginning and the last is placed beforehand.
[0222] On a key frame channel, the frame (henceforth a "interpolation frame") interpolated by the key frame of the both ends which sandwich this time amount will be

reproduced by the time amount by which the key frame is not arranged. A interpolation frame is not displayed on a key frame. In the authoring system concerning this example, when each key frame is arranged on a key frame channel, a motion which connects smoothly the pause described by each key frame is generated automatically by computer processing. Moreover, the center of gravity of 3D model can be set up by each key frame, and the motion on the appearance of 3D model can be made into the thing near the system.

[0223] Each key frame is arranged on a key frame channel so that the left end of a thumbnail may serve as time of day of a key frame. Moreover, by dragging a thumbnail to right and left along with a time-axis, it follows, and a key frame line can move and can change the time of day of the corresponding key frame. Moreover, telescopic motion of the key frame of the last pause turns into telescopic motion of the whole action time amount.

[0224] If a thumbnail is double-clicked, the pause edit window of the corresponding pause can open and a pause can be edited. However, an initial pause and the last pause are the outsides for edit, and even if it double-clicks these, a pause edit window is not opened. About the detail of a pause edit window, it explains in detail behind.

[0225] A motion channel is a field for meeting the time-axis which a time amount ruler specifies, and editing and displaying the contents of the motion.

[0226] In this example, switching operation is possible for a motion channel. The action edit window in the condition (motion detail channel) of having opened the motion channel is shown in drawing 14 . A motion is defined by actuation of each joint actuator which constitutes a mobile robot 1. By the motion channel, each timing chart which describes serial actuation of each joint actuator is listed in the shape of a tree according to biomodel (tree view).

[0227] The line graph on each timing chart shows the motion of the corresponding joint actuator, i.e., the temporal response of angle of rotation.

[0228] By dragging the crossing point of key frame Rhine and the polygonal line up and down, the set point in the time amount concerned of the corresponding joint actuator can be returned. Moreover, as a result of such drag actuation, the pause applicable to key frame Rhine also changes, and renewal of automatic also of the contents of the key frame is carried out.

[0229] On a motion detail channel, a motion of each joint actuator can be visually grasped in the format of a timing chart. Moreover, direct drag-and-drop actuation is applicable to the polygonal line. Moreover, it is also possible to carry out copy actuation of the polygonal line about a certain joint actuator to other joint actuators. Therefore, the editing task of a motion file can be performed upwards intuitively, and an editing task is saved labor sharply. Moreover, regular actuation of symmetrical actuation etc. can be easily edited by copy actuation. Moreover, even if it is a motion of the same kind, motion data may be different with a difference (namely, difference of Hardware Configuration Information which consists of combination of a CPC component) of a mobile robot's 1 model. In such a case, data conversion is applied and you may make it reuse it as different data for models based on the proper data for every model.

[0230] A motion detail channel and its tree view scroll in a lengthwise direction at a longitudinal direction list to compensate for actuation of a perpendicular direction scroll bar in a horizontal scroll bar list.

[0231] A sound channel is a field for displaying sound data along with the time-axis which a time amount ruler specifies. In this example, from an action edit window, independent "sound detail window" can be opened and the sound data of a MIDI format can be edited by GUI actuation on this window. However, a sound detail window is explained later.
[0232] The sound ON/OFF check box is arranged by the sound channel. By putting a check into this check box, a sound can be sounded at the time of playback.
[0233] An LED actuation channel is a field for displaying LED actuation data along with the time-axis which a time amount ruler specifies. In this example, from an action edit window, independent "LED detail window" can be opened and the LED actuation data of a MIDI format can be edited by GUI actuation on this window. An LED detail window is explained later.
[0234] The sound ON/OFF check box is arranged by the LED actuation channel. By putting a check into this check box, LED actuation can be energized at the time of playback.
[0235] An action edit window can receive the drag-and-drop actuation from a project window (refer to drawing 6). That is, from a project window, a motion file, a sound file, an LED file, etc. can drag and drop each file used as the component of action directly, and can register it into an action window simply.
[0236] Moreover, an action edit window is MS. The drag-and-drop actuation from Windows Explorer can also be received. That is, from this Explorer window, a motion file, a sound file, an LED file, etc. can drag and drop each file used as the component of action directly, and can register it into an action window simply. The file registered into the action window is registered also into a project window by coincidence.
[0237] The configuration of the sound detail window for editing the sound file of a MIDI format is roughly shown in drawing 15 . This sound detail window consists of a title bar, a menu bar, and an edit field that performs the editing task of a MIDI formal sound file by GUI actuation as illustration.
[0238] Each menu a "file", "edit", "a setup", and "a help" is prepared for the menu bar.
[0239] If a menu "a file" is chosen, the pull down menu which becomes a "new sound", "a sound being opened", "sound preservation", "sound new preservation", and a list from each sub menu of "closing" further will appear (refer to drawing 16).
[0240] Selection of a sub menu "a new sound" generates a new MIDI sound. When the non-saved MIDI sound is already opened, the dialog which carries out the prompt of the check of whether to save the MIDI sound to a user appears.
[0241] Selection of a sub menu "a sound is opened" opens the existing MIDI sound file. When the non-saved MIDI sound is already opened, the dialog which carries out the prompt of the check of whether to save the MIDI sound to a user appears (same as the above).
[0242] Selection of a sub menu "sound preservation" overwrites the corresponding MIDI sound file. In the case of a non-permanent file, like sound new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.
[0243] If a sub menu "sound new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0244] Selection of a sub menu "it closes" closes this sound detail window. When the

sound file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0245] If a menu "edit" is chosen, the pull down menu which becomes "it returns", "cutoff", "copy", "overwrite attachment", "insertion attachment", and a list from each sub menu "deletion" further will appear (refer to drawing 17).
[0246] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0247] If a sub menu "cutoff" is chosen, when there is selected time amount width of face, the sound in the range will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is not lost but the information about the contents of the frame of it is lost.
[0248] When a sub menu "a copy" is chosen and there is selected time amount width of face, the sound in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0249] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0250] Selection of a sub menu "insertion attachment" carries out the insertion paste of the contents currently kept in the clipboard at current time of day.
[0251] If a sub menu "deletion" is chosen, when there is selected time amount width of face, the sound in the range will be deleted. The frame itself is not lost but the information on the contents of the frame of it is lost.
[0252] If a menu "a setup" is chosen, the pull down menu which becomes "the die length of a 4 section note" and a list from each sub menu "rhythm" further will appear (refer to drawing 18).
[0253] A sub menu "the die length of a quarter note" can have a sub menu (not shown) further, can mince it only in [of a quarter note] 1 minute, and can put in a number. The die length set up here is displayed as a grid of the direction of a time-axis on a score.
[0254] A sub menu "rhythm" has the sub menu (not shown) which specifies a rhythm further. With the value set up here, the line which decides rhythm to be a time-axis grid on a score is drawn.
[0255] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0256] It returns to drawing 15 again and the edit field of the sound detail window for MIDI sounds is explained. This edit field is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. The inside of a time-line table consists of a time amount ruler, a key frame channel, a score channel, and a velocity channel.
[0257] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 15). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. Please refer to the above-mentioned [-one number] about the relation between the real time in a real-time display, and the display of a time amount ruler. Moreover, the unit of the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0258] Please refer to [Table 2] at the above-mentioned [Table 1] list about a width-of-

face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) in a list at the time of a real-time display (however, a unit is set to sec).
[0259] The end time field and the current time stamp field other than a unit change radio carbon button are included in the time amount ruler. The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.
[0260] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (not shown) for changing spacing of a time amount ruler can be called.
[0261] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively. Key frame Rhine which shows the time of day of each key frame (after-mentioned) is displayed in the form which crosses each channel top, and a user can perform the editing task of a MIDI sound, checking the synchronization with a key frame visually. Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. Moreover, he is trying for current time-of-day Rhine which shows current time to display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current time of day to the location.
[0262] By the key frame channel, the key frame location acquired from the action edit window along with the time-axis which a time amount ruler specifies is displayed. However, it is different from the case (refer to drawing 13) of the above-mentioned action edit window, and a key frame channel cannot be opened and closed in a sound detail window.
[0263] A score channel is a field for editing a MIDI sound by GUI actuation, and is constituted by a piano keyboard (however, the effective compass is different with a mobile robot's 1 model), and the basic grid of the direction of a time-axis.
[0264] With a piano keyboard, the maximum compass permitted by a mobile robot's 1 hardware specification etc. by the image display of a piano keyboard is displayed (or refreshable compass is displayed brightly and it may be made to indicate except [its] by gray). [0265] which displays absolute sound pitches, such as C3 and C4, on basic C key part The grid of the time amount width of face of the set-up quarter note is displayed on a score part. Moreover, Rhine of two grids (namely, two rhythm), three grids (three rhythm), and four grids (four rhythm) is emphasized with the value (above-mentioned) set up by rhythm.
[0266] On a score channel, a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis. One grid is called a "cel." A color is attached to a cel with a sound. However, in the case of the playback model of only one sound, a sound cannot be put on the scale from which it differs on the same time-axis.
[0267] Moreover, a click of an empty cel (that is, the color is not attached) places the sound of the die length of the note mark chosen. When a sound exists in other height on

the same time amount, a sound replaces the clicked height. A click of the cel in which a sound already exists removes the sound.
[0268] Note marks, such as 16 diacritical marks, 8 diacritical marks, a quarter note, a half note, a whole note, dotted 8 diacritical marks, a dotted quarter note, and a dotted half note, are displayed on the field on the left-hand side of a piano keyboard. These note mark shall have an exclusive selection condition mutually, and only any one shall always be chosen. Moreover, a selection item changes with mouse click actuation.
[0269] A velocity channel is a field which displays the strength of the velocity for every sound. In the example shown in drawing 15 , although sound intensity is displayed with a bar graph, it may be displayed by the line graph. The sound intensity in each joint can be depended and adjusted to dragging the maximum upper limit of a bar graph. The maximum sound volume is set up by the default.
[0270] In addition, the "playback carbon button" which directs playback actuation of the edited sound is prepared for a sound detail channel, and a potato is good for it.
[0271] Moreover, the configuration of the sound detail window for displaying the sound file of a WAVE format is roughly shown in drawing 19 . A sound detail window consists of a title bar, a menu bar, and an edit field that edits a WAVE formal sound file as illustration.
[0272] Each menu a "file", "edit", and "a help" is prepared for the menu bar.
[0273] If a menu "a file" is chosen, the pull down menu which becomes "a sound is opened", "sound preservation", "sound new preservation", and a list from each sub menu of "closing" further will appear (refer to drawing 20).
[0274] Selection of a sub menu "a sound is opened" opens the existing WAVE sound file. When the non-saved WAVE sound is already opened, the dialog which carries out the prompt of the check of whether to save the WAVE sound to a user appears.
[0275] Selection of a sub menu "sound preservation" overwrites the corresponding WAVE sound file. Moreover, if a sub menu "sound new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0276] Selection of a sub menu "it closes" closes this sound detail window. When the sound file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0277] If a menu "edit" is chosen, the pull down menu which becomes "it returns", "cutoff", "copy", "overwrite attachment", "insertion attachment", and a list from each sub menu "deletion" further will appear (refer to drawing 21).
[0278] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0279] If a sub menu "cutoff" is chosen, when there is selected time amount width of face, the sound in the range will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is lost and back is got blocked.
[0280] When a sub menu "a copy" is chosen and there is selected time amount width of face, the sound in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0281] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0282] Selection of a sub menu "insertion attachment" carries out the insertion paste of

the contents currently kept in the clipboard at current time of day.
[0283] If a sub menu "deletion" is chosen, when there is selected time amount width of face, the sound in the range will be deleted. The frame itself is not lost but the part will be in a silent condition.
[0284] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0285] The edit field of the sound detail window for WAVE sounds is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. the inside of a time-line table -- a time amount ruler, a key frame channel, and a WAVE channel -- ** -- it is constituted.
[0286] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 15). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. Please refer to the above-mentioned [-one number] about the relation between the real time in a real-time display, and the display of a time amount ruler. Moreover, the unit of the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0287] Please refer to [Table 2] at the above-mentioned [Table 1] list about a width-of-face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) in a list at the time of a real-time display (however, a unit is set to sec).
[0288] The time amount ruler includes the end time field and the current time stamp field other than a unit change radio carbon button.
[0289] The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.
[0290] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (not shown) for changing spacing of a time amount ruler can be called.
[0291] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively.
[0292] Key frame Rhine which shows the time of day of each key frame (after-mentioned) is displayed in the form which crosses each channel top, and a user can perform the editing task of a WAVE sound, checking the synchronization with a key frame visually. Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. Moreover, he is trying for current time-of-day Rhine which shows current time to display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current time of day to the location.
[0293] By the key frame channel, the key frame location acquired from the action edit window along with the time-axis which a time amount ruler specifies is displayed.

However, it is different from the case (refer to drawing 13) of the above-mentioned action edit window, and a key frame channel cannot be opened and closed in a sound detail window.
[0294] As shown in drawing 19 , the contents of the sound file of a WAVE format are expressed as a WAVE channel as a wave. However, it is different from the score channel for MIDI formats (above-mentioned), and only fundamental patching actuation is permitted on the WAVE channel.
[0295] In addition, the "playback carbon button" which directs playback actuation of the edited sound is prepared for a sound detail channel, and a potato is good for it.
[0296] Moreover, the configuration of the LED detail window for displaying and editing into drawing 22 the LED actuation file described in the MIDI format is shown roughly. A sound detail window consists of a title bar, a menu bar, and an edit field that edits a WAVE formal LED actuation file as illustration.
[0297] Each menu a "file", "edit", and "a help" is prepared for the menu bar.
[0298] If a menu "a file" is chosen, the pull down menu which becomes "new LED actuation", "LED actuation being opened", "LED actuation preservation", "LED actuation new preservation", and a list from each sub menu of "closing" further will appear (refer to drawing 23).
[0299] Selection of a sub menu "new LED actuation" generates new LED actuation. When non-saved LED actuation is already opened, the dialog which carries out the prompt of the check of whether to save the LED actuation to a user appears.
[0300] Selection of a sub menu "LED actuation is opened" opens existing LED actuation and file. When non-saved LED actuation is already opened, the dialog which carries out the prompt of the check of whether to save the MIDI sound to a user appears (same as the above).
[0301] Selection of a sub menu "LED actuation preservation" overwrites the corresponding LED actuation file. In the case of a non-permanent file, like LED actuation new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.
[0302] If a sub menu "LED actuation new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0303] Selection of a sub menu "it closes" closes this LED actuation detail window. When the LED actuation file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0304] If a menu "edit" is chosen, the pull down menu which becomes "it returns", "cutoff", "copy", "overwrite attachment", "insertion attachment", and a list from each sub menu "deletion" further will appear (refer to drawing 17).
[0305] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0306] If a sub menu "cutoff" is chosen, when there is selected time amount width of face, LED actuation in the range will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is not lost but the information about the contents of the frame of it is lost.
[0307] When a sub menu "a copy" is chosen and there is selected time amount width of face, LED actuation in the range is copied. The copied data are temporarily kept in a clipboard in fact.

[0308] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0309] Selection of a sub menu "insertion attachment" carries out the insertion paste of the contents currently kept in the clipboard at current time of day.
[0310] If a sub menu "deletion" is chosen, when there is selected time amount width of face, LED actuation in the range will be deleted. The frame itself is not lost but the information on the contents of the frame of it is lost.
[0311] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0312] It returns to drawing 22 again and the edit field of an LED detail window is explained. This edit field is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. The inside of a time-line table consists of a time amount ruler, a key frame channel, and a score channel.
[0313] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 22). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. Please refer to the above-mentioned [-one number] about the relation between the real time in a real-time display, and the display of a time amount ruler. Moreover, the unit of the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0314] Please refer to [Table 2] at the above-mentioned [Table 1] list about a width-of-face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) in a list at the time of a real-time display (however, a unit is set to sec).
[0315] The time amount ruler includes the end time field and the current time stamp field other than a unit change radio carbon button. The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.
[0316] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (not shown) for changing spacing of a time amount ruler can be called.
[0317] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively. Key frame Rhine which shows the time of day of each key frame (after-mentioned) is displayed in the form which crosses each channel top, and a user can perform the editing task of the LED actuation described in the MIDI format, checking the synchronization with a key frame visually. Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. Moreover, he is trying for current time-of-day Rhine which shows current time to display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current

time of day to the location.
[0318] The key frame location acquired from the action edit window along with the time-axis which a time amount ruler specifies is expressed as a key frame channel. However, it is different from the case (refer to drawing 13) of the above-mentioned action edit window, and a key frame channel cannot be opened and closed in an LED detail window.
[0319] A score channel is a field for editing the LED actuation described by GUI actuation in a MIDI format, and is constituted by the list of parts which have arranged LED on mobile-robot 1 body, and the basic grid of the direction of a time-axis. In this example, LED is arranged at least at each part of **** (******), a right eye alpha and a left eye alpha, a right eye beta, a left eye beta, a right eye gamma, a left eye gamma, a tail alpha, and a tail beta.
[0320] On a score channel, the score for every list is constituted at least for each part by displaying the lighting situation of LED like each part on a time-axis. One grid is called a "cel." The color and the color according to lighting reinforcement are attached to the cel of the location equivalent to the part which LED turns on on a time-axis. It is different from the score channel (refer to the above-mentioned and drawing 15) which edits a MIDI sound, and luminescence/putting out lights of LED like each part can be done independently.
[0321] It is shown in the left of a score channel the LED part visual ** table. This carries out the graphic expression only of each part of LED which can be changed.
[0322] Moreover, the velocity mark is displayed on as visual a lower part as the LED section. A velocity mark is a mark which displayed classes, such as a rise, a high end keeping, and descent. These marks shall have an exclusive selection condition mutually, and one shall always be chosen by something. Moreover, a selection item changes with mouse clicks.
[0323] The authoring system concerning this example is preparing the preview window, in order to check visually the contents of action edited on the above-mentioned action edit window.
[0324] The configuration of a preview window is roughly shown in drawing 25 . As shown in this drawing, a preview window consists of a "3D view", and the "current time-of-day field" and a "playback carbon button group". [a "3D display change carbon button group", and]
[0325] The three-dimension mobile robot's 1 image generated by computer graphics processing is always displayed on 3D view. By dragging on this view, the direction of a look can be moved and how a view appears can be changed. Moreover, although not illustrated, you may constitute so that 3D model can be previewed from two or more views to coincidence. Moreover, a motion of a view is interlocked with the user input actuation on a 3D display change carbon button group. Moreover, in case creation processing of the 3D display of a motion is carried out, at least each part is equipped with the collision (collision) of comrades, or the check function of the drive rate of each joint with 3D model. Moreover, the center of gravity of 3D model can be set up by each key frame, and the motion on the appearance of 3D model can be made into the thing near the system.
[0326] Moreover, the LED actuation preview field for displaying LED actuation is arranged in the right-hand side of 3D view. In this preview field, it is made to synchronize with a motion of the mobile robot 1 on 3D view mentioned above, and signs

that a mobile robot's 1 LED blinks are displayed.
[0327] Each carbon button "rotation", "zoom-in/out", a "pan", and a "home location" is arranged in the 3D display change carbon button group. A user can change the direction of a look in 3D view by carrying out click actuation of these carbon buttons.
[0328] For example, if a rotation carbon button is clicked, it will become rotation mode, and if 3D view is dragged henceforth, the mobile robot 1 in 3D view will rotate.
[0329] Moreover, if zoom-in / out carbon button is clicked, it will become zoom mode, and if 3D view is dragged up and down henceforth, the mobile robot 1 in 3D view will do zoom-in/out.
[0330] moreover -- if 3D view will become panmode if a pancarbon button is clicked, and 3D view is dragged vertically and horizontally henceforth -- 3D view -- a pan -- that is, high-speed migration is carried out.
[0331] Moreover, if a home location carbon button is clicked, a mobile robot's 1 three-dimensional display will return to the condition of having seen from the default view of a look, i.e., default direction.
[0332] The current time of day of the contents of drawing currently displayed on 3D view is displayed on the current time-of-day field (current time-of-day"04:60" is displayed in the example shown in this drawing). If the alphabetic character this field has a meaning as time of day is inputted, the display of 3D view will change to the frame of the corresponding time of day. Moreover, the time-of-day location of KARENTO is relatively indicated by visual.
[0333] Each carbon button "rewinding [of a frame]", "a front key frame", "a play/stop", "coma delivery of a frame", "frame delivery", and "loop-formation playback" is arranged in the playback carbon button group.
[0334] If it clicks "rewinding [of a frame]", the display of 3D view will return to the first frame. If "a front key frame" is clicked, the display of 3D view will fly to the last key frame from a current location. Moreover, a click of "a play/stop" starts or suspends playback of 3D view display (during a play, a play/stop button is stopped and acts as a play during a stop). Moreover, if "coma delivery of a frame" is effective only during playback of 3D view display and it is clicked, coma delivery of one frame will be carried out. Moreover, a click of "frame delivery" advances the display of 3D view to the last frame. Moreover, a click of "loop-formation playback" carries out loop-formation playback of the display of 3D view.
[0335] Moreover, the authoring system concerning this example is preparing the pause window, in order to edit a mobile robot's 1 three-dimension-pause by GUI actuation which makes a drag the keynote.
[0336] The pause edited on a pause window can be used as a key frame which constitutes a motion. For example, this pause window can be started by double-clicking a desired key frame on a key frame channel.
[0337] The configuration of a pause window is roughly shown in drawing 26 . On this pause window, angle of rotation of each joint actuator which constitutes a mobile robot 1 is directly directed by GUI actuation, and a desired pause can be specified simply. A pause window consists of a stereo viewing area, the list appointed field, a set point field, a 3D viewing area, a 3D display change carbon button group, and display change pop up.
[0338] A mobile robot's 1 expansion top view is displayed, and a user is made to choose the part which can be edited in the stereo appointed field. the item of list assignment

chooses the selected part -- having -- a 3D display top -- highlighting -- or it blinks and the contents of set point area change.
[0339] In the list appointed field, a mobile robot's 1 part which can be edited and the set point are displayed as a list. if a user chooses a specific part out of this list, in the stereo appointed field, the corresponding part will carry out highlighting -- having -- 3D viewing area -- highlighting -- or it blinks and the contents of the set point field change.
[0340] In the set point field, a list indication of the maximum is given at the setting part name of each part which can be edited, the set point, and the minimum value list that can be set up. If a specific part with a user is chosen, the contents will change. The set point can be keyed directly in the field which can be inputted. The expression of an include angle can be considered as a radii expression, and the set point can be changed by dragging Rhine for assignment.
[0341] In 3D viewing area, a mobile robot's 1 whole body image generated by 3D graphics is drawn with the ground. A user can choose that part by clicking the part which corresponds from this 3D display, and highlighting of the selection part is carried out. Furthermore, the set point can be directly changed by dragging a selection part.
[0342] The contents of a display in 3D viewing area are being interlocked with the 3D display change carbon button, and can change by dragging the view top of this 3D viewing area, the way of a look, i.e., direction, a view appears.
[0343] Each carbon button "rotation", "zoom-in/out", a "pan", and a "home location" is arranged in the 3D display change carbon button group. A user can change the direction of a look in 3D viewing area by carrying out click actuation of these carbon buttons.
[0344] For example, if a rotation carbon button is clicked, it will become rotation mode, and if 3D viewing area is dragged henceforth, the mobile robot 1 in 3D viewing area will rotate. Moreover, if zoom-in / out carbon button is clicked, it will become zoom mode, and if 3D viewing area is dragged up and down henceforth, a mobile robot 1 will do zoom-in/out within 3D viewing area. moreover -- if it will become panmode if a pancarbon button is clicked, and 3D viewing area is dragged vertically and horizontally henceforth -- the inside of 3D viewing area -- a mobile robot 1 -- a pan -- that is, high-speed migration is carried out. Moreover, if a home location carbon button is clicked, a mobile robot's 1 three-dimensional display will return to the condition of having seen from [default] the look.
[0345] Moreover, by clicking a carbon button, the pop up menu (not shown) which consists of a transverse plane / tooth back / right lateral / left lateral / top face / a base / 3D is displayed, and display change pop up is changed to a view from the direction chosen by menu selection.
[0346] The "O.K." carbon button and "cancellation" carbon button are prepared for the pause window. If the O.K. carbon button is clicked, all the edit items in this window will be confirmed, and this window will be closed. On the other hand, if a Cancel button is clicked, all edit items will be made into an invalid and this window will be closed (common knowledge).
[0347] In addition, a pause window can be used, not only when editing a mobile robot's 1 pause on an authoring system but when using it in order to read into a system the joint value of the posture, i.e., each joint actuator, instilled to the mobile robot 1 according to the activity of direct teaching real on a plane etc. and to preview it.
[0348] In the form of the flow chart shows the procedure for previewing the contents

which carried out direct teaching on the system on a pause window to drawing 27 . Hereafter, it explains according to this flow chart.
[0349] First, a mobile robot's 1 operator holds a fuselage, each leg, etc. by hand on the system, makes it take a desired pause, and performs direct teaching (step S1).
[0350] Subsequently, the set point in parts which can be edited, such as each joint actuator obtained as a result of this direct teaching, is read, and it once saves (step S2), and, subsequently to an authoring system, transmits (step S3).
[0351] Especially the data transfer approach to an authoring system is not asked. For example, contiguity wireless data transmission like Bluetooth may be used, and it may be made to move data between equipment through archive media, such as a memory stick.
[0352] In an authoring system side, if the set point of the part which can be edited is read (step S4), the contents of a display and the contents of drawing will be updated (step S5). [in / the pause window mentioned above is opened, on the other hand, it in the actual condition appointed field, the list appointed field and set point area as the read set point, and / to a list / 3D viewing area]
[0353] Moreover, the authoring system concerning this example is preparing the motion pre viewer for previewing the motion edited by the motion channel (above-mentioned), or the motion which used as the key frame each pause edited by the POVU window.
[0354] The configuration of a motion pre viewer is roughly shown in drawing 28 . This motion pre viewer is opened by double-clicking the motion file shown for example, in the project window the tree table.
[0355] On a motion pre viewer, while previewing a motion, in order to paste on an action edit window, a pause can be copied.
[0356] In a motion pre viewer, the thumbnail of one or more key frames, i.e., a pause, which constitute a motion is displayed. The array of a key frame follows the time series for example, at the time of motion playback.
[0357] The key frame in a motion pre viewer can be dragged to an action edit window. Moreover, when there are many key frames which constitute the motion under preview and it is not settled in a window, it is made to carry out horizontal scrolling.
[0358] It has explained in detail about this invention, referring to a specific example more than [addenda]. However, it is obvious that this contractor can accomplish correction and substitution of this example in the range which does not deviate from the summary of this invention.
[0359] Although explained in detail in this example about the authoring system which mentions as an example the pet mold robot which performs quadrapedalism which imitated the dog, and starts this invention, the summary of this invention is not limited to this. for example, a leg formula mobile robot of 2 pairs of shoes like a humanoid robot -- or please understand enough that this invention is applicable similarly also to migration mold robots other than a leg formula.
[0360] Moreover, the "multi-Seki nodal character object" indicated by the column of the [claim] of this specification is not limited to a physical machinery like many articulated robots including a leg formula robot. For example, it is also possible to apply the authoring system which starts this invention for creation and edit of the operating sequence of the animation using the character generated by computer graphics.
[0361] In short, with the gestalt of instantiation, this invention has been indicated and it should not be interpreted restrictively. In order to judge the summary of this invention,

the column of the claim indicated at the beginning should be taken into consideration.
[0362]
[Effect of the Invention] As a full account was given above, according to this invention, the outstanding authoring system and the outstanding authoring approach of supporting creation and edit of a series of command/data which describe a robot's predetermined pattern of operation can be offered.
[0363] Moreover, according to this invention, the outstanding authoring system and the outstanding authoring approach of supporting creation and edit of a pattern of operation using the set of the components which specify a robot's operating state can be offered.
[0364] Moreover, according to this invention, the outstanding authoring system and the outstanding authoring approach of arranging each part article on a computer display, and supporting creation and edit of a pattern of operation can be offered.
[0365] Motion data, sound data, LED actuation data, etc. arrange each time series data which constitute a mobile robot's action along with a time-axis, and he is trying to display them on the time table of a two-dimensional time-line format according to the authoring system and the authoring approach concerning this invention. therefore, creation and edit of can be done, checking the synchronization between each time series data visually -- the work environment of intelligible action edit can be offered efficiently and intuitively.
[0366] According to the authoring system and the authoring approach concerning this invention, the tool which can treat multi-Seki nodal character objects including a robot as new play can be offered. According to this invention, even if there is no advanced knowledge about computer programming, action of multi-Seki nodal character objects including a robot can be programmed, and contents can be created easily. For example, if a user can use it as a tool for expressing a multi-Seki nodal character object and it puts in another way, he can extend the world which a robot offers.
[0367] According to the authoring system and the authoring approach concerning this invention, a user can perform programming about the action sequence of a multi-Seki nodal character object through GUI actuation. Furthermore, programming on a GUI screen can be made still easier and efficient by having a variety of libraries in stock to abundance.
[0368] It is constituted by unifying each contents called a motion, a sound, and LED actuation, a robot's action sequence, i.e., behavior. According to this invention, the work environment which can take the synchronization between contents easily can be offered by using the time line for the edit display of each [these] contents. On the GUI edit display concerning this invention, it can process as each data, and also each contents can be treated the format, i.e., in the form of action, unified with other contents.

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the authoring system and the authoring approach for supporting creation and edit of the data according to a predetermined scenario, and relates to the authoring system and the authoring approach of supporting creation and edit of a series of command/data which describe a robot's predetermined pattern of operation especially.
[0002] Furthermore, in detail, this invention relates to the authoring system and the authoring approach of supporting creation and edit of a pattern of operation using the set of the components which specify a robot's operating state, and relates to the authoring system and the authoring approach of arranging each part article on a computer display, and supporting creation and edit of a pattern of operation especially.

[Translation done.]

PRIOR ART

[Description of the Prior Art] The thing of the machinery which performs movement modeled on actuation of human being using the electric or magnetic operation is called "robot." It is said that a robot's origin of a word originates in ROBOTA (slave machine) of a slab word. Although it was in our country that a robot began to spread from the end of the 1960s, the many were the industrial robots (industrial robot) in works aiming at automation, full automation, etc. of production, such as a manipulator and a carrier robot.
[0004] Recently, the researches and developments about the structure of leg formula mobile robots, such as a robot (humanoid robot) of "the human form" which imitated the body mechanism of the animal which performs 2-pair-of-shoes walks in erect posture, such as a pet mold robot which imitated the body mechanism of the animal of quadrapedalism and its actuation like a dog or a cat or Homo sapiens, and an ape, and actuation, or "a human mold", or its stable walk control progress, and the expectation for utilization has also been growing. although these leg formula mobile robot compares with a crawler type robot, it is unstable and attitude control and walk control become difficult -- rise and fall of a stairway and an obstruction -- getting over -- etc. -- it excels in the

point that flexible walk / transit actuation is realizable.
[0005] Like an arm type robot, the robot of a deferment type which is implanted and used for a certain specific location works only in fixed and local workspaces, such as assembly, a sorting activity, etc. of components. On the other hand, the robot of workspace of a portable type is un-restrictive, and he can move free in a predetermined path or non-path top, and the human activity of predetermined or arbitration can be executed by proxy, or he can offer the various services which replace Homo sapiens, a dog, or other life objects.
[0006] As one of the applications of a leg formula mobile robot, vicarious execution of various kinds of difficulty activities in an industrial activity, a production activity, etc. is mentioned. For example, it is vicarious execution of the maintenance in a nuclear power plant, a thermal power station plant, and a petrochemical plant, conveyance and assembly operation of the components in a plant, cleaning in a skyscraper, and the risk activity and difficulty activity like the rescue in a fire site and others etc.
[0007] Moreover, the application of "symbiosis" or "entertainment" of a life adhesion mold, i.e., human being, is mentioned rather than above-mentioned activity exchange as other applications of a leg formula mobile robot. This kind of robot emulates the rich feeling expression using the mechanisms of operation and the limbs of a leg formula ambulatory exercise with comparatively high intelligence, such as Homo sapiens or a dog (pet). Moreover, it is also required that the lively response expression which it not only performs faithfully the pattern of operation inputted beforehand, but corresponded dynamically to a partner's language and attitudes ("it strikes") should be realized. ["it praises" or "he scolding",]
[0008] The conventional toy machine has the fixed relation between user actuation and response actuation, and cannot change actuation of a toy according to liking of a user. Consequently, a user becomes ********** soon about the toy which repeats only the same actuation.
[0009] On the other hand, the intellectual robot has the behavioral model and learning model resulting from actuation, and realizes autonomous thinking and motion control by changing a model based on input, such as voice from the outside, and an image, a tactile sense, and opting for actuation. When a robot prepares a feeling model and an instinct model, the autonomous action according to a robot's own feeling and instinct can be expressed. Moreover, when a robot equips a picture input device and voice-input/output equipment and performs image recognition processing and speech recognition processing, it also becomes possible to realize realistic communication with human being on more advanced intellectual level.
[0010] moreover, it answers having detected the stimulus from the outside, such as user actuation, and this model is changed -- namely

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[Translation done.]

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

By giving the "study effectiveness", or it does not get bored for a user, the pattern of operation which was adapted for liking can be offered.
[0011] The leg formula mobile robot of these days has high information processing capacity, and can regard the robot itself as a kind of computing system. Therefore, the altitude and a series of complicated operating sequences which are constituted by the combination of the pattern of operation realized on a robot or two or more fundamental patterns of operation are built according to the same activity as computer programming.
[0012] Moreover, a robot's diffusion rate will increase increasingly from now on, and it will be expected that a robot permeates deeply not only the industrial world but ordinary homes and everyday life. About the product which pursues entertainment nature, it is especially expected [that a consuming public layer without the advanced knowledge about a computer or computer programming purchases and uses a robot in many cases, and]. It is thought desirable to offer the tool for supporting creating and editing a robot's operating sequence comparatively easily and efficiently by interactive processing also for such a general user, i.e., an authoring system.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the outstanding authoring system and the outstanding authoring approach of supporting creation and edit of a series of command/data which describe a robot's predetermined pattern of operation.
[0014] The further purpose of this invention is to offer the outstanding authoring system and the outstanding authoring approach of supporting creation and edit of a pattern of operation using the set of the components which specify a robot's operating state.
[0015] The further purpose of this invention is to offer the outstanding authoring system and the outstanding authoring approach of arranging each part article on a computer display, and supporting creation and edit of a pattern of operation.

[Translation done.]

OPERATION

[Means for Solving the Problem and its Function] This invention is made in consideration of the above-mentioned technical problem. The 1st side face The user input section which is an authoring system for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data, and inputs a command and data from a user, The user presentation section which presents the edit field which put in order each time series data which constitute action synchronous along with the time-axis, It is the authoring system characterized by providing the time series data-editing section which was prepared for each [which constitutes action] time series data of every, and which creates or edits the time series data which correspond based on the user input through said user presentation section.

[0017] However, it does not especially ask whether the "system" said here means the thing of an object which gathered logically, and two or more equipments (or functional module which realizes a specific function) are in a case with single each equipment and functional module.

[0018] Although multi-Seki nodal character objects are leg formula mobile robots, such as 2 pairs of shoes which consists of two or more joint actuators, and 4 etc. pairs of shoes, they may be the other articulated robot or a character in which animation is generated by computer graphics processing according to actuation of a joint.

[0019] Moreover, as time series data which constitute action of a multi-Seki nodal character object, it is motion data which described serial actuation of each joint of a multi-Seki nodal character object, for example. serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly because motion data arrange the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis -- with -- **** -- it can also specify.

[0020] Moreover, other examples of the time series data which constitute action are sound data by which a voice output is carried out to playback of action synchronizing with a time amount target. Sound data can be described in a MIDI (Musical Instrumental Digital Interface) format or a WAVE format.

[0021] Moreover, other examples of the time series data which constitute action are the indicator indicative datas which described lighting/disappearance actuation, the display

indicator, i.e., LED, by which a display output is carried out to playback of action synchronizing with a time amount target. An indicator indicative data can be described in a MIDI format.

[0022] The edit field which said user presentation section presents can arrange and constitute the time series data display channel for every time series data in a lengthwise direction along with the time-axis set as the longitudinal direction.

[0023] That is, according to the authoring system concerning the 1st side face of this invention, motion data, sound data, LED actuation data, etc. can arrange and display each time series data which constitute a mobile robot's action along with a time-axis on the time table of a two-dimensional time-line format. therefore, creation and edit of can be done, checking the synchronization between each time series data visually -- the work environment of intelligible action edit can be offered efficiently and intuitively.

[0024] You may make it include the time amount ruler which consists of graduations which carry out the real-time display of the time-axis to the edit field which said user presentation section presents. In such a case, the synchronization with each time series data channel and a time-axis can be made easy to check visually.

[0025] Moreover, you may make it the edit field which said user presentation section presents equipped with one or more time stamp Rhine run to a lengthwise direction to show the applicable time of day specified by the time amount ruler. In such a case, on the basis of time stamp Rhine, the advance situation between each time series data channel is visually made a check, or it becomes easy to check visually the synchronization between each time series data channel.

[0026] Moreover, the edit field which said user presentation section presents may be equipped with current time stamp Rhine run to a lengthwise direction to show the current time on the time-axis specified by the time amount ruler. You may make it move this current time stamp Rhine to the location by which user actuation was carried out on the time amount ruler.

[0027] Moreover, the edit field which said user presentation section presents may be equipped with the viewing window which previews a motion of the multi-Seki nodal character object in current time.

[0028] Moreover, the edit field which said user presentation section presents may be equipped with the key frame channel for displaying each key frame or its thumbnail according to the time-axis which a time amount ruler specifies. Drag actuation of a key frame or its thumbnail is followed, and you may make it receive the time change of a key frame within this key frame channel. Moreover, you may make it start the pause edit display which answers the key frame within a key frame channel, or own alternative actuation of the thumbnail, and edits the corresponding pause.

[0029] Moreover, the edit field which said user presentation section presents may be equipped with the motion channel for meeting the time-axis which a time amount ruler specifies, and editing and displaying the contents of the motion. This motion channel arranges each timing chart showing the serial actuation for every joint of a multi-Seki nodal character object to a lengthwise direction, and is constituted. You may make it receive modification of the joint in the time of day which follows and corresponds to the drag actuation on the timing chart within a motion channel of operation.

[0030] Moreover, the edit field which said user presentation section presents may be equipped with the sound channel for displaying the contents of the sound along with the

time-axis which a time amount ruler specifies, and the display indicator channel for displaying the contents of the indicator indicative data along with the time-axis which a time amount ruler specifies.
[0031] Moreover, you may make it the user presentation section display further the sound edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the sound.
[0032] The sound edit field may contain the score channel constituted by a piano keyboard and the basic grid of time amount shaft orientations. In such a case, a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis, and a sound can be edited on a score channel by coloring a desired time-of-day list in the color which corresponds on the cel corresponding to a scale at a note. Moreover, you may make it display collectively the velocity channel which displays the strength of the velocity for every sound along with a time-axis.
[0033] Moreover, you may make it the user presentation section display further the display indicator edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the indicator indicative data.
[0034] A display indicator edit field is constituted by the basic grid of the list of parts, and time amount shaft orientations which has arranged the display indicator, and may also contain a score channel. In such a case, on a score channel, at least each part can edit the score for every list by displaying the lighting situation of the display indicator like each part on a time-axis.
[0035] Moreover, you may make it the user presentation section display further the preview window for checking visually action of the multi-Seki nodal character object generated based on each time series data edited by the time series data-editing section.
[0036] This preview window may be equipped with 3D view field which displays in three dimensions a motion of the multi-Seki nodal character object generated based on motion data. Moreover, the preview window may be equipped with the display indicator actuation preview field for displaying the actuation of a display indicator based on an indicator indicative data synchronizing with the preview of other time series data.
[0037] Moreover, you may make it the user presentation section display further the pause window for editing the pause of a multi-Seki nodal character object by GUI actuation.
[0038] This pause window may include the stereo appointed field which displays a multi-Seki nodal character object on an expansion top view, and receives the own alternative of the part which can be edited. Moreover, the pause window may include the part of a multi-Seki nodal character object which can be edited, and the list appointed field which displays the set point in a list. Moreover, the pause window may include the set point field which indicates the maximum by list in the setting part name of each part of a multi-Seki nodal character object which can be edited, the set point, and the minimum value list that can be set up. Moreover, a pause window may contain 3D viewing area which receives the own alternative of the part which can be edited on this 3D display while carrying out 3D display of the whole body image of the multi-Seki nodal character object generated by 3D graphics.
[0039] Moreover, the authoring system may be further equipped with a data input means to input from the outside the time series data which constitute action of a multi-Seki nodal character object. In such a case, you may make it a pause window display the pause generated based on the data inputted from said data input means.

[0040] Moreover, you may make it the user presentation section display further the motion preview window which arranged one or more key frames which constitute a motion, or the thumbnail of those according to the time series at the time of motion playback.
[0041] Moreover, the 2nd side face of this invention is the authoring approach for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data. The user presentation step which presents the edit field which put in order each time series data which constitute action synchronous along with the time-axis, It is the authoring approach characterized by providing the time series data-editing step which creates or edits the time series data which correspond based on the user input through the edit field by said user presentation step prepared for each [which constitutes action] time series data of every.
[0042] Here, as time series data which constitute action of a multi-Seki nodal character object, it is motion data which described serial actuation of each joint of a multi-Seki nodal character object, for example. serial actuation of each joint of a multi-Seki nodal character object which connects between each key frame smoothly because motion data arrange the key frame expressing the multi-Seki nodal character object which made a predetermined pose two or more on a time-axis -- with -- **** -- it can also specify.
[0043] Moreover, other examples of the time series data which constitute action are sound data by which a voice output is carried out to playback of action synchronizing with a time amount target, and can be described in a MIDI format or a WAVE format. Moreover, other examples of the time series data which constitute action are the indicator indicative datas which described lighting/disappearance actuation, the display indicator, i.e., LED, by which a display output is carried out to playback of action synchronizing with a time amount target, and can be described in a MIDI format.
[0044] The edit field shown in said user presentation step can arrange and constitute the time series data display channel for every time series data in a lengthwise direction along with the time-axis set as the longitudinal direction.
[0045] That is, according to the authoring approach concerning the 2nd side face of this invention, motion data, sound data, LED actuation data, etc. can arrange and display each time series data which constitute a mobile robot's action along with a time-axis on the time table of a two-dimensional time-line format. therefore, creation and edit of can be done, checking the synchronization between each time series data visually -- the work environment of intelligible action edit can be offered efficiently and intuitively.
[0046] You may make it include the time amount ruler which consists of graduations which carry out the real-time display of the time-axis to the edit field shown in said user presentation step. In such a case, the synchronization with each time series data channel and a time-axis can be made easy to check visually.
[0047] Moreover, you may make it the edit field shown in said user presentation step equipped with one or more time stamp Rhine run to a lengthwise direction to show the applicable time of day specified by the time amount ruler. In such a case, on the basis of time stamp Rhine, the advance situation between each time series data channel is visually made a check, or it becomes easy to check visually the synchronization between each time series data channel.
[0048] Moreover, you may make it show an edit field equipped with current time stamp Rhine run to a lengthwise direction to show the current time on the time-axis specified by

the time amount ruler at said user presentation step. In such a case, you may have further the step which moves this current time stamp Rhine to the location by which user actuation was carried out on the time amount ruler.
[0049] Moreover, you may have further the step which presents the viewing window which previews a motion of the multi-Seki nodal character object in current time.
[0050] Moreover, you may make it show an edit field equipped with the key frame channel for displaying each key frame or its thumbnail according to the time-axis which a time amount ruler specifies at said user presentation step. In such a case, the step which follows the key frame within a key frame channel or drag actuation of the thumbnail, and changes the time of day of a key frame may be included further. Moreover, the step which starts the pause edit display which answers the key frame within a key frame channel or own alternative actuation of the thumbnail, and edits the corresponding pause may be included further.
[0051] Moreover, you may make it show the edit field equipped with the motion channel for meeting the time-axis which a time amount ruler specifies, and editing and displaying the contents of the motion at said user presentation step. In such a case, each timing chart showing the serial actuation for every joint of a multi-Seki nodal character object is arranged to a lengthwise direction, and you may make it display a motion channel. Moreover, you may have further the step which changes actuation of the joint in the time of day which follows and corresponds to the drag actuation on the timing chart within a motion channel.
[0052] Moreover, you may make it show the edit field equipped with the sound channel for displaying the contents of the sound along with the time-axis which a time amount ruler specifies at a user presentation step. Or you may make it show the edit field equipped with the display indicator channel for displaying the contents of the indicator indicative data along with the time-axis which a time amount ruler specifies at a user presentation step.
[0053] Moreover, the authoring approach may be further equipped with the step which displays the sound edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the sound.
[0054] The sound edit field may contain the score channel constituted by for example, a piano keyboard and the basic grid of time amount shaft orientations. In such a case, a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis, and a sound can be edited on this score channel by coloring a desired time-of-day list in the color which corresponds on the cel corresponding to a scale at a note. Moreover, the sound edit field may contain the velocity channel which displays the strength of the velocity for every sound along with a time-axis.
[0055] Moreover, the authoring approach may be further equipped with the step which displays the display indicator edit field for meeting the time-axis which a time amount ruler specifies, and displaying and editing the contents of the indicator indicative data.
[0056] A display indicator edit field is constituted by the basic grid of the list of parts, and time amount shaft orientations which has arranged for example, the display indicator, and may contain the score channel. In such a case, at least each part can edit the score for every list on a score channel by displaying the lighting situation of the display indicator like each part on a time-axis.
[0057] Moreover, the authoring approach may be further equipped with the step which

displays the preview window for checking visually action of the multi-Seki nodal character object generated based on each time series data edited in the time series data-editing step.
[0058] A motion of the multi-Seki nodal character object generated based on motion data may be displayed in three dimensions to 3D view field, or you may make it express the actuation of a display indicator based on an indicator indicative data as the step which displays this preview window on a display indicator actuation preview field synchronizing with the preview of other time series data.
[0059] Moreover, the authoring approach may be further equipped with the step which displays the pause window for editing the pause of a multi-Seki nodal character object by GUI actuation.
[0060] The stereo appointed field which this pause window displays a multi-Seki nodal character object on an expansion top view, and receives the own alternative of the part which can be edited, The part of a multi-Seki nodal character object which can be edited, and the list appointed field which displays the set point in a list, The setting part name of each part of a multi-Seki nodal character object which can be edited, the set point, the set point field that indicates the maximum by list at the minimum value list which can be set up, While carrying out 3D display of the whole body image of the multi-Seki nodal character object generated by 3D graphics, 3D viewing area which receives the own alternative of the part which can be edited on this 3D display may be included.
[0061] Moreover, the authoring approach may be further equipped with the data input step which inputs from the outside the time series data which constitute action of a multi-Seki nodal character object. In such a case, you may make it display the pause generated based on the data inputted in said data input step on a pause window.
[0062] Moreover, the authoring approach may be further equipped with the step which displays the motion preview window which arranged one or more key frames which constitute a motion, or the thumbnail of those according to the time series at the time of motion playback.
[0063] Moreover, the 3rd side face of this invention It is the storage which stored physically the computer software described to perform processing for supporting creation and edit of action of the multi-Seki nodal character object which consists of combination of two or more time series data on computer system in the computer-readable format. The user presentation step which presents the edit field which put in order each time series data from which said computer software constitutes action synchronous along with the time-axis, It is the storage characterized by providing the time series data-editing step which creates or edits the time series data which correspond based on the user input through the edit field by said user presentation step prepared for each [which constitutes action] time series data of every.
[0064] The storage concerning the 3rd side face of this invention is a medium which offers computer software physically in a computer-readable format to the computer system of the versatility which can perform various program codes, for example. Attachment and detachment of CD (Compact Disc), FD (Floppy(trademark) Disc), MO (Magneto-Optical disc), etc., etc. are free for such a medium, and it is a storage of portability. Or it is also technically possible to provide specific computer system with computer software in a computer-readable format via transmission media, such as a network (for a network not to ask distinction of wireless and a cable), etc.

[0065] Such a storage defines the collaboration-relation on the structure of the computer software and the storage for realizing the function of computer software predetermined in a computer system top, or a function. If it puts in another way, by installing predetermined computer software in computer system through the storage concerning the 3rd side face of this invention, on computer system, a collaboration-operation is demonstrated and the same operation effectiveness as the authoring system and the authoring approach concerning each 1st [of this invention] and 2nd side faces can be acquired.
[0066] The purpose, the description, and advantage of further others of this invention will become [rather than] clear by detailed explanation based on the example and the drawing to attach of this invention mentioned later.
[0067]
[Embodiment of the Invention] Hereafter, the example of this invention is explained in detail, referring to a drawing.
[0068] A. The appearance configuration of the mobile robot 1 which performs the leg formula walk by the limbs with which operation is presented in this invention is shown in a robot's block diagram 1 . This robot 1 is a mobile robot of the multi-joint mold constituted by using as a model the configuration and structure of an animal of having the limbs as illustration. User actuation was answered and the mobile robot 1 of this example can especially do an expression of operation while he has a side face of the pet mold robot designed by imitating the configuration and structure of a dog which are the example of representation of a pet, for example, coexists with human being in human being's living conditions.
[0069] A mobile robot 1 consists of, the idiosoma unit 2, a head unit 3, a tail 4, and Limbs 6A-6D, i.e., leg units.
[0070] The head unit 3 is arranged in the upper limit before abbreviation of the idiosoma unit 2 through the neck joint 7 with a roll, a pitch, and the degree of freedom of each shaft orientations (illustration) of a yaw. Moreover, the CCD (Charge Coupled Device: charge-coupled device) camera 15 equivalent to the "eye" of a dog, the microphone 16 equivalent to a "lug", the loudspeaker 17 equivalent to "opening", the touch sensor 18 equivalent to tactile feeling, and two or more LED indicators 19 are carried in the head unit 3. The sensor which constitutes a living body's senses besides these may be included.
[0071] The tail 4 is attached in the abbreviation Gokami edge of the idiosoma unit 2 free [a curve or rocking] through the tail joint 8 with the degree of freedom of a roll and a pitching axis.
[0072] The leg units 6A and 6B constitute a forefoot, and the leg units 6C and 6D constitute hind legs. Each leg units 6A-6D consist of combination of the femoral region units 9A-9D and the leg part units 10A-10D, and are attached in each corner of front and rear, right and left of the base of the idiosoma unit 2, respectively. The femoral region units 9A-9D are connected with each predetermined part of the idiosoma unit 2 by the hip joints 11A-11D with a roll, a pitch, and the degree of freedom of each shaft of a yaw. Moreover, it is connected by the knee joints 12A-12D with the degree of freedom of a roll and a pitching axis between the femoral region units 9A-9D and the leg part units 10A-10D.
[0073] the leg formula mobile robot 1 constituted like illustration making the head unit 3 shake vertically and horizontally by driving each joint actuator by the command from a

control section mentioned later, or making a tail 4 wag **** -- each -- a foot -- Units 6A-6D -- a synchronization -- it is made to drive cooperatively and actuation of a walk, transit, etc. can be realized.

[0074] In addition, in fact, a mobile robot's 1 joint degree of freedom is arranged for every shaft, and is offered by the rotation drive of a joint actuator (not shown). Moreover, the number of the joint degree of freedom which the leg formula mobile robot 1 has is arbitrary, and does not limit the summary of this invention.

[0075] The block diagram of the electrical and electric equipment and control network of a mobile robot 1 is typically shown in drawing 2 . As shown in this drawing, a mobile robot 1 consists of the control section 20 which performs generalization-control of the whole actuation, and other data processing, the I/O section 40, a mechanical component 50, and a power supply section 60. Hereafter, each part is explained.

[0076] The I/O section 40 contains various kinds of sensors of CCD camera 15 which is equivalent to a mobile robot's 1 eyes as the input section, the microphone 16 equivalent to a lug, the touch sensor 18 equivalent to tactile feeling, or others equivalent to the senses. Moreover, the loudspeaker 17 equivalent to opening or LED indicator 19 which forms the expression of a face by the combination of flashing or the timing of lighting is equipped as the output section. These output section can express the user feedback from a mobile robot 1 in the form of [other than a machine movement pattern with a foot etc.].

[0077] A mobile robot 1 can recognize the objective configuration and the color of arbitration which exist on workspace by a camera 15 being included. Moreover, the mobile robot 1 may have further the receiving set which receives dispatch waves other than a vision means like a camera, such as infrared radiation, an acoustic wave, a supersonic wave, and an electric wave. In this case, based on the sensor output which detects each carrier wave, the location and sense from the source of dispatch are measurable.

[0078] A mechanical component 50 is functional block which realizes machine movement of a mobile robot 1 according to the predetermined movement pattern which a control section 20 orders it, and consists of drive units prepared for every shafts, such as a roll in each joint, such as the neck joint 7, the tail joint 8, hip joints 11A-11D, and knee joints 12A-12D, a pitch, and a yaw. A mobile robot 1 has the joint degree of freedom of n pieces, therefore a mechanical component 50 is constituted from the example of illustration by n drive units. Each drive unit consists of combination of the driver 53 which controls the rotation location and rotational speed of a motor 51 accommodative based on the output of the motor 51 which performs rotation actuation of the circumference of a predetermined shaft, the encoder 52 which detects the rotation location of a motor 51, and an encoder 52.

[0079] A power supply section 60 is a functional module which supplies electric power to each electrical circuit in literal [the] and a mobile robot 1 etc. The mobile robot 1 concerning this example is the autonomous drive type which used the dc-battery, and a power supply section 60 consists of a charge dc-battery 61 and a charge-and-discharge control section 62 which manages the charge-and-discharge condition of the charge dc-battery 61.

[0080] The charge dc-battery 61 consists of gestalten of the "battery pack" which package-ized two or more nickel cadmium battery cels to the cartridge-type.

[0081] Moreover, the charge-and-discharge control section 62 grasps the remaining

capacity of a dc-battery 61 by measuring the terminal voltage of a dc-battery 61, charge/strength of discharge current, the ambient temperature of a dc-battery 61, etc., and determines an initiation stage, a termination stage, etc. of charge. The initiation and the termination stage of charge which the charge-and-discharge control section 62 determines are notified to a control section 20, and serve as a trigger for a mobile robot 1 to start and end charge operation.

[0082] A control section 20 is equivalent to "brains", for example, is carried in a mobile robot's 1 head unit 3 or idiosoma unit 2.

[0083] The configuration of a control section 20 is further illustrated in the detail at drawing 3 . As shown in this drawing, the control section 20 has the composition that the bus connection of CPU (Central Processing Unit)21 as a Maine controller was carried out to each circuit component, which are memory and others, or a peripheral device. A bus 27 is a common signal-transmission way containing a data bus, an address bus, a control bus, etc. The address (a memory address or I/O Address) of a proper is assigned at each to each equipment on a bus 27, and CPU21 can communicate with the specific equipment on a bus 28 by addressing.

[0084] RAM (Random Access Memory)22 is the memory which consisted of volatile memory, such as DRAM (Dynamic RAM), and which can be written in, loads the program code which CPU21 performs, or is used for temporary preservation of the activity data based on an executive program.

[0085] ROM (Read Only Memory)23 is a read-only memory which stores a program and data everlastingly. The self-test test program performed to a mobile robot's 1 power up, the control program of operation which specifies actuation of a mobile robot 1 are mentioned to the program code stored in ROM23.

[0086] The "sensor input-process program" which processes sensor inputs, such as a camera 15 and a microphone 16, the "action instruction program" which generates a mobile robot's 1 action, i.e., a movement pattern, based on a sensor input and a predetermined model of operation, and the "drive control program" etc. which controls the drive of each motor, the voice output of a loudspeaker 17, etc. according to the generated movement pattern are contained in a robot's 1 control program. High actuation of entertainment nature, such as a "hand", a "rain check", "stability", and utterance of the cry of animals, such as "one one", may be included in the movement pattern generated in addition to usual locomotion and usual transit movement.

[0087] Moreover, creation and various kinds of edited operating-sequence programs are included, using an authoring tool as a control program of others of a robot 1. An authoring tool is started under a software execution environment predetermined in the computer system top installed for example, in the robot 1 exterior. However, it explains in detail to the program created and edited by the authoring tool list on this tool, therefore the back.

[0088] Like EEPROM (Electrically Erasable and Programmable ROM), nonvolatile memory 24 consists of memory devices in which elimination re-writing is possible electrically, and it is used in order to hold the data which should be updated serially in un-volatilizing. Security information, such as a serial number and a cryptographic key, the various models which specify a mobile robot's 1 behavior pattern are mentioned to the data which should be updated serially.

[0089] An interface 25 is equipment for interconnecting with the device besides a control

section 20, and making the data exchange possible. An interface 25 performs data I/O between a camera 15, a microphone 16, and a loudspeaker 17. Moreover, an interface 25 is each driver 53-1 in a mechanical component 50. -- I/O of data or a command is performed in between.

[0090] An interface 25 Moreover, serial interface, such as RS(Recommended Standard)-232C, Parallel interfaces, such as IEEE (Institute of Electrical and electronics Engineers)1284, A USB (Universal Serial Bus) interface, An i-Link (IEEE1394) interface, a SCSI (Small Computer System Interface) interface, It has a general interface for peripheral-device connection of computers, such as a memory card interface, and may be made to perform program and migration of data between the external instruments by which local connection was made.

[0091] Moreover, as other examples of an interface 25, it has an infrared-ray-communication (IrDA) interface, and may be made to perform an external instrument and radio.

[0092] Furthermore, a control section 20 can perform an external host computer 100 and data communication via contiguity radio as shown in "bluetooth" or ".11B" or LAN (Local Area Network: (trademark), for example, Ethernet), or the Internet including radio interface 26 Network Interface Card (NIC) 27. As for the transceiver section for radio, it is desirable from a viewpoint of receiving sensibility to be installed in the point of mobile-robot 1 bodies, such as the head unit 2 and a tail 3.

[0093] One purpose of the data communication between such a mobile robot 1 and a host computer 100 is calculating a mobile robot's 1 complicated motion control, or operating by remote control using the computer resource of the robot 1 exterior (namely, remoteness).

[0094] Moreover, other purposes of this data communication are to supply data and program of the robots 1, such as a model of operation and other program codes, required for motion control to a mobile robot 1 from the equipment of a network course and remoteness.

[0095] Moreover, other purposes of this data communication are debugging processings of the real time according using an authoring tool (after-mentioned) to collaboration-actuation with download of the program for creation and the robot motion control which edited, the host computer 100 of such a program for motion control, and a robot 1 on a host computer 100.

[0096] Moreover, other purposes of this data communication are transmitting the set points of operation, such as include-angle data of each joint actuator with which an operator's specifies the pause which carried out direct teaching to the mobile robot 1, to a host computer 100 side. On a host computer 100, the "pause" specified by the include-angle data of such each joint actuator can be edited on a pause window, and the key frame for a motion can be created. In short, the pause supplied by the mobile robot 1 is applicable to edit of action (after-mentioned).

[0097] A control section 20 may be equipped with the keyboard 29 which consists of a ten key and/or an alphabet key. A keyboard 29 is used in a robot's 1 work site for command input with a direct user, and also it is used for the input of owner authentication information, such as a password.

[0098] The mobile robot 1 concerning this example can perform autonomous (that is, a help does not intervene) actuation, when a control section 20 performs a predetermined

control program of operation. Moreover, while having an input unit equivalent to the senses of human beings, such as an image input (namely, camera 15), voice input (namely, microphone 16), and a touch sensor 18, or an animal, it has the intelligence which performs reasonable or emotional action which answered these external inputs.
[0099] The mobile robot 1 constituted as shown in drawing 1 - drawing 3 has the following descriptions. Namely, [0100] (1) When changing from a certain posture to other postures is directed, between each posture cannot be changed directly but it can change via an in-between posture without the unreasonableness prepared beforehand.
(2) A notice can be received when the posture of arbitration is reached by posture transition. (3) Attitude control can be carried out, managing a posture independently in each unit unit, such as a head, a foot, and the tail section. Namely, apart from the whole robot's 1 posture, a posture is manageable for every unit.
(4) A parameter to show the detail of actuation of an instruction of operation can be passed.
[0101] As shown in drawing 3 , the mobile robot 1 concerning this example interconnects with the external host computer 100 via the network. Or the means of communications of radio (for example, bluetooth and .11B short distance wireless data transmission) or others may connect in the host computer 100.
[0102] On a host computer 100, a predetermined software execution environment is built, under this environment, an authoring tool can be started, and a robot's 1 operating sequence can be created and edited comparatively easily and efficiently by interactive processing. However, about the detail of an authoring tool, it mentions later.
[0103] In drawing 4 , the example of a hardware configuration of a host computer 100 is illustrated typically. Hereafter, each part in a computer 100 is explained.
[0104] CPU (Central Processing Unit)101 which is the Maine controller of a system 100 performs various kinds of applications under control of an operating system (OS). Although OS offers the GUI (Graphical User Interface) environment more preferably, it is good at Windows 98 [UNIX (trademark) or] of U.S. Microsoft/NT, for example.
[0105] CPU101 interconnects with other equipments (after-mentioned) by bus 107 as illustration. The memory address or I/O Address of a proper is given to each device on a bus 107, respectively, and device access is possible for CPU101 by these addresses. Although buses 107 are a data bus, an address bus, and a common signal-transmission way containing a control bus, the example is a PCI (Peripheral Component Interconnect) bus.
[0106] Memory 102 is storage used since the program code performed in a processor 101 is stored or the activity data under activation are stored temporarily. Please understand the memory 102 shown in this drawing to be a thing containing both un-volatilizing and volatilization memory.
[0107] The display controller 103 is an exclusive controller for actually processing the drawing instruction which CPU101 publishes, for example, supports a bit map drawing function equivalent to SVGA (Super Video Graphic Array) or XGA (eXtended Graphic Array). Once it is written in a frame buffer (not shown), the screen output of the drawing data processed in the display controller 103 is carried out at a display 111. Indicating equipments 111 are for example, a CRT (Cathode Ray Tube) display, a liquid crystal display display (Liquid Crystal Display), etc.
[0108] The input device interface 104 is equipment for connecting user input devices,

such as a keyboard 112 and a mouse 113, to a system 100. The input device interface 104 answers the coordinate directions input through the key input or mouse 113 by the keyboard 112, and generates interruption to CPU101.

[0109] According to predetermined communications protocols, such as Ethernet, it can connect with networks, such as LAN (Local Area Network), or the network interface 105 can connect a system 100 to short-distance wireless data transmission like bluetooth or .11B. Generally, the network interface 105 is offered with the gestalt of a LAN adapter card, and the PCI bus slot on a mother board (not shown) equips with it, and it is used.

[0110] In the example shown in drawing 3 , although the host computer 100 interconnects with the robot 1 via wireless data transmission or a network, of course, both may be connected by other means of communications and data migration means. For example, it may be made to perform exchange and migration of data through an archive medium like memory card (memory stick).

[0111] Moreover, on the network, two or more host computers (not shown) are connected in the transparent condition, and the distributed computing environment is built. Distribution of a software program, data contents, etc. is performed on a network. For example, the authoring tool concerning this example, the action sequence program for robots (the action file which serves as an action sequence further, a motion file, a sound file, LED actuation file) created and edited by this authoring tool can be distributed via a network. Moreover, network distribution service of such a program/data may be offered the charge or for nothing.

[0112] The external instrument interface 106 is equipment for connecting external devices, such as a hard disk drive (HDD) 114 and the media drive 115, to a system 100. The external instrument interface 106 is based on interface specification, such as IDE (Integrated Drive Electronics) and SCSI (Small Computer System Interface).

[0113] HDD114 is the external storage which carried the magnetic disk as storage support fixed (common knowledge), and excels other external storage in points, such as memory capacity and a data transfer rate. It calls it "install" to the system of a program to place on HDD116 in the condition that a software program can be performed. Usually, the program code of the operating system which a processor 511 should perform, an application program, a device driver, etc. are stored in HDD114 in un-volatilizing. For example, creation and the edited action sequence program for robots are installable on HDD114 using the authoring tool concerning this example, and this authoring tool.

[0114] Moreover, the media drive 115 is equipment for loading with portable mold media, such as CD (Compact Disc), and MO (Magneto-Optical disc), DVD (Digital Versatile Disc), and accessing a data-logging side. Portable mold media are used in order to mainly move backing up a software program, a data file, etc. as data of a computer-readable format, and these between systems (that is, sale, circulation, and distribution are included). For example, these portable mold media can be used, and the authoring tool concerning this example, the action sequence program for robots (the action file which serves as an action sequence further, a motion file, a sound file, LED actuation file) created using this authoring tool can be physically circulated and distributed between devices.

[0115] In addition, an example of the host computer 100 as shown in drawing 4 is the compatible machine or succeeding machine of personal computer"PC/AT(Personal Computer/Advanced Technology)" of U.S. IBM. Of course, it is also possible to apply

the computing system equipped with other architecture as a host computer 100 concerning this example.

[0116] B. In configuration this example of an authoring system, creation and edit of the control program of operation which consists of a series of command/data which describe a robot's 1 predetermined pattern of operation can be done using the authoring tool started on the host computer 100. Moreover, creation and the edited control program of operation are transmitted to a robot 1 side using radio means, such as bluetooth and .11B, using this authoring tool, and collaboration-actuation with a host computer 100 and a robot 1 performs debugging processing. That is, the authoring system for supporting creation and edit of a mobile robot's 1 control program of operation is built by organic association between a host computer 100 and a robot 1.

[0117] In drawing 5 , the whole authoring system configuration is illustrated typically.

[0118] In a host computer 100 side, a user can use the GUI (Graphical User Interface) screen which an authoring tool offers, and can create and edit the scenario of a convention of a mobile robot 1 by mouse actuation. About the detail of the editing operation on this GUI screen, it mentions later in the GUI screen list for scenario creation. Or a user can use the usual text editor etc., and can create and edit a robot's 1 control program of operation in a script format (for example, high level language formats, such as C).

[0119] An authoring tool changes the scenario which the user created and edited on the GUI screen, and the control program of the script format created and edited on the text editor of operation into the mnemonic code of a format similar to the assembler called "RCODE".

[0120] RCODE said here is the programming language upon which it was decided in order to control a robot 1 by the easy command, and since it also has fundamental control structures, such as "IF" and "GO", it can be used also as a minimum level script language for robot controls.

[0121] The RCODE actuation control program created and edited on the host computer 100 is movable to a robot 1 side using media, such as a memory stick. Moreover, at the time of debugging of a RCODE actuation control program, a RCODE program is taken out for every line, and it enciphers, and transmits to a robot 1 side serially using radio means, such as bluetooth and .11B.

[0122] On the other hand, in the robot 1 side, it has an interpreter/debugger, middleware, the driver, and the operating system (OS) as activation and the debugging environment of the control program of operation described by RCODE etc.

[0123] An interpreter is a high-level-language program which reads at a time the program of one line described in the RCODE format, interprets it, and performs it. However, in the time of debugging etc., when a RCODE program is transmitted in the format enciphered from the host computer 100 side, once an interpreter decrypts this, it needs to perform interpretation and activation.

[0124] A debugger discovers the error in a RCODE program (bug), and is a program which supports the activity which corrects. That is, according to the debugger, activation can be stopped in the line which specified the program, or the memory at that time and the contents of the variable can be referred to.

[0125] Middleware is an assembly of a software module which offers a robot's 1 fundamental function, and the configuration of each module is influenced of hardware

attributes, such as a robot's 1 mechanical and electric property and specification, and a configuration. Middleware is functionally divided roughly into the middleware of a recognition system, and the middleware of an output system.

[0126] The middleware of a recognition system is an engine which receives raw data from hardware, such as image data, voice data, and detection data obtained from other sensors, via a virtual robot, and processes these. That is, based on various input, speech recognition, distance detection, posture detection, contact, motion detection, color recognition, etc. are processed, and a recognition result is obtained. A recognition result is notified to the application layer (action sequence program) of a high order.

[0127] On the other hand, in the middleware of an output system, functions, such as a walk, playback of a motion, composition of an output sound, and flashing control of a LED indicator, are offered. That is, the action plan drawn up in the application layer is received, the servo command value of each joint of a robot, an output sound, output light (LED), output voice, etc. are generated for every function of a robot 1, and it demonstrates on a robot 1.

[0128] A driver is a program code for operating hardware of each joint actuator or others.

[0129] In this example, the driver is mounted in the middleware list by the object-oriented program. The software based on object-oriented is fundamentally treated in the module unit of the "object" which made the processing procedure over data and its data unify. Moreover, if needed, two or more objects are created or one software is completed by combining. Generally, according to the object oriented programming, it is thought that the efficiency of development and maintenance of software is increased.

[0130] An operating system (OS) performs control about management of the data communication between these objects, and other program executions. OS is also mounted by the object-oriented program.

[0131] C. The scenario of operation created using the authoring tool concerning creation / edit this example of the program for robots of operation using an authoring tool is realized in creation and edit of "behavior", and creation and edit of "action", and the result object is called a "project." Hardware Configuration Information which consists of combination of physical components, such as a mobile robot's 1 configuration (CPC:Configured Peripheral Component), i.e., a fuselage, a head, and the leg, is set to the project.

[0132] A project consists of a behavior file, an action file, a motion file, a sound file, and an LED actuation file. Behavior is constituted by the combination of action. Moreover, action uses each contents, such as a motion, a sound, and LED actuation, as a component.

[0133] A motion file is a file which specifies actuation of each joint actuator of a mobile robot 1. By this example, by arranging serially two or more key frames which described signs that the mobile robot 1 was made to take a desired pause on the GUI edit display can prescribe a motion. However, about the editing task of the motion on a GUI edit display, it explains in detail behind.

[0134] A sound file is sound data for carrying out a voice output through a loudspeaker 17, for example, is constituted as a file of MIDI (Musical Instrumental Digital Interface) or a WAVE format. For example, the sound file described in the MIDI format is not as information on the sound itself, performance information, such as magnitude, die length, a tone, and effectiveness, is changed into numeric data, and music is expressed. Although performance information can be edited in this example by operating each numeric data of

the MIDI format which constitutes sound through a GUI edit display, about this point, it explains in detail behind.

[0135] An LED actuation file is data for specifying the combination of lighting of two or more LED indicators 19, and the timing of flashing, and is used for the purpose of forming the expression of a face. In this example, an LED actuation file can be described in a MIDI format, and can edit an LED actuation file now free through a GUI edit display. However, about the editing task on a GUI edit display, it explains in detail behind.

[0136] A motion, a sound, and LED actuation are the components of action, and are time series data which change according to the passage of time. In order to reproduce action correctly, each [these] component must synchronize in time. Although each file can be edited on a GUI edit display in this example so that lighting of a motion, a sound, and LED may synchronize on a time-axis mutually, about this point, it explains in detail behind.

[0137] Action is constituted by unifying each contents called the motion file and sound file by which the synchronization was taken on the time-axis, and an LED actuation file. One action file is a command (it is also called "semantics") reproduced in general in about 10 seconds. In this example, the work environment for the action edit which can take the synchronization between each contents to preparation is offered by using the time line on a GUI edit display so that it may mention later. Moreover, each contents can be processed as each data, and also it can treat the format, i.e., in the form of action, unified with other contents.

[0138] Behavior is a file which is constituted by putting two or more commands, i.e., action, in order and which specifies behavior of a mobile robot 1. Action is reproduced from a start to an end in an one direction. On the other hand, behavior can specify the sequence which reproduces action. Furthermore, it can box-ize, branching based on conditions or a probability, and two or more commands, i.e., action, and a subroutine can be defined. Therefore, behavior can be compared with action and can describe a mobile robot's 1 complicated action sequence with altitude more.

[0139] The functional configuration of an authoring system is typically shown in drawing 29 . As shown in this drawing, especially the authoring system concerning this example is designed for [of action] edits, and consists of the action editorial department, the key frame editorial department, the motion editorial department, the sound editorial department, the LED actuation editorial department, and a user interface control section that realizes the editing task of the user by each [these] functional module by the dialogic operation by the GUI screen.

[0140] The action editorial department is a functional module for editing a motion file, a sound file, and an LED actuation file in the format that a synchronization is taken on a time-axis. The action editorial department shows a user the action edit window for setting up the timing of the joint actuation (motion) in alignment with a mobile robot's 1 time-axis, and a sound and LED actuation through a user interface control section. Although the action edit window is equipped with the edit field which consists of a table of the time-line format for setting up various kinds of files on a time-axis, it is yielded to the after-mentioned about the detail of an action edit window.

[0141] The key frame editorial department is a functional module for editing the image frame which described the pause in the time of day when the mobile robot which

performs a key frame, i.e., a motion, corresponds. The key frame editorial department is answered and called to the user actuation to the action editorial department, and the editing task by the user is received through the key frame channel opened on an action edit window. Although the thumbnail showing a key frame is put on each location where it corresponds on a time-axis by the key frame channel, the after-mentioned is yielded about the detail of a key frame channel.

[0142] The motion editorial department is a functional module for editing serial actuation of each joint actuator which constitutes a motion, i.e., a mobile robot. The motion editorial department is answered and called to the user actuation to the action editorial department, and the editing task by the user is received through the motion channel opened on an action edit window. Although each timing chart which describes serial actuation of each joint actuator is listed in the shape of a tree by the motion channel according to biomodel (tree view), the after-mentioned is yielded about the detail of a motion channel.

[0143] Moreover, the motion editorial department shows a user the pause window for editing a mobile robot's 1 pause, and the motion pre viewer for previewing the finished motion through the user interface section on 3D display screen. The after-mentioned is yielded about the detail of a pause window or a motion pre viewer.

[0144] The sound editorial department is a functional module for setting up the detail of the sound which is one of the components of action. In this example, a sound is treated in a MIDI format or a WAVE format. The sound editorial department shows a user the sound detail window for setting up the detail of a sound along a time-axis top through a user interface control section. The sound detail window is equipped with the edit field which consists of a table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. However, the after-mentioned is yielded about the detail of a sound detail window. The contents set up on the sound detail window are used for the display on the sound channel in an action edit window (after-mentioned).

[0145] The LED actuation editorial department is a functional module for setting up the detail of the LED actuation which is one of the components of action. In this example, LED actuation is treated in a MIDI format. The LED actuation editorial department shows a user the LED detail window for setting up the detail of LED actuation along a time-axis top through a user interface control section. Although the LED detail window is equipped with the edit field which consists of a table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction, it is yielded to the after-mentioned about the detail of an LED detail window. The contents set up on the LED detail window are used for the display on the LED actuation channel in an action edit window (after-mentioned).

[0146] A user interface control section shows a user a project window at the time of project edit.

[0147] Moreover, a user interface control section answers the user directions through each edit window, and can access now each file system (or database) which manages a behavior file, an action file, a motion file, a sound file, and an LED actuation file.

[0148] Subsequently, it explains in detail on the authoring system concerning this example about procedure for a user to create and edit a mobile robot's 1 scenario of operation.

[0149] At the time of project edit, a "project window" as shown in drawing 6 is displayed. A project window contains a list viewing area with a title bar, a menu bar, and a tool bar. A project window is constituted as for example, a SDI (Single Document Interface) Maine window. (SDI is the user interface of a type which opened one document in one window.)
[0150] In a project window, the list of each files, such as a behavior file used for edit of action, an action file, a motion file, a sound file, and an LED actuation file, is displayed on the edit list of behavior in a tree format as illustration.
[0151] If the item on the list of behavior and action is double-clicked, the corresponding edit window (refer to drawing 9 in the below-mentioned list) will open. Moreover, if the thumbnail of a motion is double-clicked, a motion preview window (refer to drawing 28 in the below-mentioned list) will open.
[0152] A project window has the function which displays the detailed information about the item which is on a tree list and was chosen.
[0153] A thumbnail, a file name, provisions of classification, easy explanation of operation, the operating time, etc. are included in the detailed information about behavior. A thumbnail (initial pause), a file name, the operating time, an initial pause, a termination pause, file capacity, etc. are contained in the detailed information about action. A thumbnail (initial pause), a file name, the operating time, an initial pause, a termination pause, file capacity, etc. are contained in the detailed information about a motion. A thumbnail (icon showing a sound), a file name, the operating time, file capacity, etc. are contained in the detailed information about a sound. A thumbnail (icon showing LED actuation), a file name, the operating time, file capacity, etc. are contained in the detailed information about LED actuation.
[0154] Moreover, the menu bar containing each menu a "file", "edit", a "material", and "a help" is prepared above the project window.
[0155] If a menu "a file" is chosen, the pull down menu which becomes a "new project", "a project being opened", "project preservation", "project new preservation", and a list from each sub menu "termination" further will appear (refer to drawing 7).
[0156] Selection of a sub menu "a new project" generates a new project. When the non-saved project is already opened, the dialog which carries out the prompt of the check of whether to save the project to a user appears.
[0157] Selection of a sub menu "a project is opened" opens the existing project file. When the non-saved project is already opened, the dialog which carries out the prompt of the check of whether to save the project to a user appears (same as the above).
[0158] Selection of a sub menu "project preservation" overwrites the corresponding project file. In the case of a non-permanent file, like project new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.
[0159] If a sub menu "project new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0160] Selection of a sub menu "termination" closes this project window. When the project file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0161] Moreover, if a menu "a material" is chosen, the pull down menu which becomes "new behavior creation", "new action creation", "material reading", and a list from each

sub menu "material deletion" further will appear (refer to drawing 8).
[0162] If a sub menu "new behavior creation" is chosen, it will open in the condition that a behavior edit window is new. The behavior is automatically added to the list of the behavior in a project window. since behavior edit is not related directly, it is not explained to be the summary of this invention any more by this detail letter.
[0163] If a sub menu "new action creation" is chosen, it will open in the condition that an action edit window (refer to drawing 9 in the below-mentioned list) is new. The action is automatically added to the list of action in a project window.
[0164] If a sub menu "material reading" is chosen, a file designation dialog will appear and an available material file will be registered into a project. It is the same as that of the case where drag-and-drop actuation is carried out from Explorer.
[0165] Only when a sub menu "material deletion" is chosen and an item is in a selection condition, it becomes an effective display, and if chosen, the item will be deleted from the list of [in a project window]. However, a file is not necessarily deleted from a directory.
[0166] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0167] Moreover, the tool carbon button for calling often used functions, such as a new behavior creation carbon button (New Behavior), a new action creation carbon button (New Action), and a garbage can (Trash), in an instant is arranged in the lower part of a menu bar.
[0168] A new behavior creation carbon button is equivalent to the sub menu "new behavior creation" in a menu "a material." Moreover, a new action creation carbon button is equivalent to the sub menu "new action creation" in a menu "a material." Moreover, a garbage can is equivalent to the sub menu "material deletion" in a menu "a material."
[0169] In the project window, the so-called drag-and-drop actuation is permitted. That is, drag actuation can be carried out and the file icon on Explorer can be directly registered into the location of the request on a tree.
[0170] Moreover, drag actuation of the material on a tree list can also be carried out in each edit window. Action can be dragged to a behavior window. Moreover, a motion, a sound, and LED actuation can be dragged to an action window.
[0171] The configuration of an action edit window is roughly shown in drawing 9 . On this action edit window, the timing of the joint actuation (motion) in alignment with a mobile robot's 1 time-axis, and a sound and LED actuation can be set up. The edit result in this edit window is saved as an action file with extension "act". In addition, in the case of an authoring system which is preparing the action edit window which changes with differences (or difference of Hardware Configuration Information which consists of combination of a CPC component) of a mobile robot's 1 model, you may constitute so that an action edit window may change according to the model-selection actuation by the user.
[0172] An action edit window consists of a title bar, a menu bar, and an edit field that sets up motion data, sound data, and LED actuation data on a time-axis as illustration.
[0173] Each menu a "file", a "material", and "a help" is prepared for the menu bar.
[0174] If a menu "a file" is chosen, the pull down menu which becomes "new action", "action being opened", "action preservation", "action new preservation", "system playback", and a list from each sub menu of "closing" further will appear (refer to

drawing 10).
[0175] Selection of a sub menu "new action" generates new action. When non-saved action is already opened, the dialog which carries out the prompt of the check of whether to save the action to a user appears.
[0176] Selection of a sub menu "action is opened" opens the existing action file. When non-saved action is already opened, the dialog which carries out the prompt of the check of whether to save the action to a user appears (same as the above).
[0177] Selection of a sub menu "action preservation" overwrites the corresponding action file. In the case of a non-permanent file, like action new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.
[0178] If a sub menu "action new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0179] If a sub menu "system playback" is chosen, the action file edited on the action edit window shown in drawing 9 will be transmitted to the system 1, i.e., a mobile robot, and playback actuation will be tried actually. An action file may be transmitted to a mobile robot 1 through short-distance wireless data transmission like Bluetooth, or may move between equipment through media like memory card (memory stick).
[0180] Selection of a sub menu "it closes" closes this action edit window. When the action file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0181] When a menu "edit" is chosen, further Moreover, "it returns", "cutoff", A "motion copy", a "sound copy", "LED copy", "overwrite attachment", The pull down menu which becomes "insertion attachment", "deletion", "key-frame-izing", "frame insertion", "assignment frame number insertion", "frame deletion", and a list from each sub menu "assignment frame deletion" appears (refer to drawing 11).
[0182] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0183] If a sub menu "cutoff" is chosen, when there is selected time amount width of face and there are not a motion in the range and time amount width of face, the motion of the frame, a sound, and LED actuation will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is not lost but the information about the contents of the frame of it is lost.
[0184] When a sub menu "a motion copy" is chosen and there is selected time amount width of face, the motion in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0185] When a sub menu "a sound copy" is chosen and there is selected time amount width of face, the sound in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0186] When a sub menu "an LED copy" is chosen and there is selected time amount width of face, LED actuation in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0187] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0188] Selection of a sub menu "insertion attachment" carries out the insertion paste of the contents currently kept in the clipboard at current time of day.

[0189] If a sub menu "deletion" is chosen, when there is selected time amount width of face, the motion in the range is deleted, and when there is no time amount width of face, the motion of the frame, a sound, and LED actuation, i.e., action of the frame, will be deleted.
[0190] Selection of a sub menu "key-frame-izing" key-frame-izes the frame of current time of day. That is, the pause interpolated between the existing key frames can be generated, and this can be made into new key frame data.
[0191] If a sub menu "frame insertion" is chosen, when there is selected time amount width of face, the frame for the time amount will be inserted in current time of day by the frame. The whole action time amount will be extended by only insertion frame time as a result of this frame insertion actuation.
[0192] If a sub menu "assignment frame number insertion" is chosen, the dialog of a numerical input will appear and the frame for a numeric value inputted on this dialog will be inserted. The unit of the numeric value to input is considered as time amount assignment. The whole action time amount will be prolonged by only assignment frame time as a result which performs insertion actuation of this assignment frame number.
[0193] If a sub menu "frame deletion" is chosen, when there is selected time amount width of face, the frame for the time amount will be deleted from current time of day. Under the present circumstances, the frame which was in the left in the edit field is packed. As a result of this frame deletion actuation, the whole action time amount of deletion frame time will shrink.
[0194] If a sub menu "assignment frame deletion" is chosen, the dialog of a numerical input will appear and the frame for a numeric value inputted on this dialog will be deleted. The unit of the numeric value to input is considered as time amount assignment. Under the present circumstances, the frame which was in the left in the edit field is packed. As a result of this assignment frame deletion actuation, the whole action time amount of assignment frame time will shrink.
[0195] Moreover, if a menu "a material" is chosen, the pull down menu which becomes "reading of a motion", "the beginning of a motion", "reading of a sound", "the beginning of a sound", "reading of LED", and a list from each sub menu "the beginning of LED" further will appear (refer to drawing 12).
[0196] If a sub menu "reading of a motion" is chosen, it will read from the storing location (for example, local disk) which specified the motion file, and will insert in the current time of day on the motion channel in an edit field (after-mentioned). The key frame contained in a motion file turns into a key frame as it is in the case of this reading processing.
[0197] Selection of a sub menu "the beginning of a motion" saves the motion of the selected time amount width of face in the storing location (for example, local disk) specified as a motion file.
[0198] If a sub menu "reading of a sound" is chosen, it will read from the storing location (for example, local disk) which specified the sound file, and will insert in the current time of day on the sound channel in an edit field (after-mentioned).
[0199] Selection of a sub menu "the beginning of a sound" saves the sound of the selected time amount width of face in the storing location (for example, local disk) specified as a sound file of for example, a MIDI format.
[0200] If a sub menu "reading of LED" is chosen, it will read from the storing location

(for example, local disk) which specified the LED actuation file, and will insert in the current time of day on the LED channel in an edit field (after-mentioned).
[0201] Selection of a sub menu "the beginning of LED" saves LED actuation of the selected time amount width of face in the storing location (for example, local disk) specified as an LED file of for example, a MIDI format.
[0202] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0203] It returns to drawing 9 again and the edit field of an action edit window is explained. The edit field of an action edit window is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction as illustration. In a time-line table, it consists of a time amount ruler, a key frame channel, a motion channel, a sound channel, and an LED actuation channel.
[0204] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 9). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. The relation between the real time in a real-time display and the display of a time amount ruler is illustrated below.
[0205]
[Equation 1]
00:00 = 0 second 05:23 = 5 second 2313:87 = 13 second 87[0206] Moreover, the unit of the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0207] A width-of-face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) is carried out as follows at a list at the time of a real-time display (however, a unit is set to sec).
[0208]
[Table 1]
実時間表示時

設定値（表示）	表示可能秒数	目盛数字	補助目盛
1frame=0.5 pixel (0.5px/fr)	約 20.12 秒	02:00 (62.5px 毎)	00:20 (6.25px 毎)
1frame=1pixel (1px/fr)	約 10.24 秒	01:00 (62.5px 毎)	00:10 (6.25px 毎)
1frame=2pixel (2px/fr)	約 5.12 秒	01:00 (125px 毎)	00:10 (12.5px 毎)
1frame=3pixel (3px/fr)	約 3.41 秒	00:50 (93.75px 毎)	00:05 (9.375px 毎)
1frame=4pixel (4px/fr)	約 2.56 秒	00:50 (125px 毎)	00:05 (12.5px 毎)
1frame=6pixel (6px/fr)	約 1.7 秒	00:25 (93.75px 毎)	00:025 (9.375px 毎)
1frame=8pixel (8px/fr)	約 1.28 秒	00:25 (125px 毎)	00:025 (12.5px 毎)

[0209]
[Table 2]

フレーム数表示時

設定値（表示）	表示可能秒数	目盛数字	補助目盛
1frame=0.5 pixel (0.5px/fr)	約 20.12 秒	200 (100px 毎)	20 (10px 毎)
1frame=1pixel (1px/fr)	約 10.24 秒	100 (100px 毎)	10 (100px 毎)
1frame=2pixel (2px/fr)	約 5.12 秒	50 (100px 毎)	5 (10px 毎)
1frame=3pixel (3px/fr)	約 3.41 秒	25 (75px 毎)	2.5 (7px 毎)
1frame=4pixel (4px/fr)	約 2.56 秒	25 (100px 毎)	2.5 (10px 毎)
1frame=6pixel (6px/fr)	約 1.7 秒	10 (60px 毎)	5 (6px 毎)
1frame=8pixel (8px/fr)	約 1.28 秒	10 (80px 毎)	1 (8px 毎)

[0210] However, the number of seconds which is said here and which can be displayed is the near number of seconds which can be displayed at the time of the maximization window of the display corresponding to SVGA (Super Video Graphic Array). Moreover, a time amount ruler scrolls appropriately by scrolling (actuation of a horizontal-scrolling bar) of a time-axis.

[0211] The time amount ruler includes the end time field and the current time stamp field other than a unit change radio carbon button.

[0212] The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.

[0213] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (neither is illustrated) for changing the "last pause assignment pop up menu" for specifying the "initial pause assignment pop up menu" for specifying an initial pause and the last pause and spacing of a time amount ruler can be called.

[0214] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively.

[0215] Key frame Rhine which shows the time of day of each key frame (after-mentioned) is made to be displayed in the form which crosses each channel top. Therefore, a user can perform an editing task, checking the synchronization between a motion, a sound, and LED actuation visually.

[0216] Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. End time Rhine can also be caught with last pause key frame Rhine.

[0217] Moreover, he is trying for current time-of-day Rhine which shows current time to

display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current time of day to the location.
[0218] When the preview window (not shown) is open in the edit field, a mobile robot's 1 three-dimension image in current time of day is always displayed. An authoring system 1 generates automatically the interpolation frame equivalent to current time of day, and such a three-dimension image is acquired by performing image processings, such as coordinate transformation, based on actuation of each joint actuator at that time etc.
[0219] A key frame channel is a field for displaying a key frame according to the time-axis which a time amount ruler specifies.
[0220] In this example, switching operation is possible for a key frame channel. The action edit window in the condition (key frame detail channel) of having opened the key frame channel is shown in drawing 13 . By the key frame channel, the thumbnail showing a key frame is put on each location where it corresponds on a time-axis. The "key frame" said here is an image frame which described the pause in the time of day when the mobile robot which performs a motion corresponds.
[0221] An initial pause and the last pause are special key frames located in the start of a key frame channel, and an end, respectively. The key frame of the beginning and the last is placed beforehand.
[0222] On a key frame channel, the frame (henceforth a "interpolation frame") interpolated by the key frame of the both ends which sandwich this time amount will be reproduced by the time amount by which the key frame is not arranged. A interpolation frame is not displayed on a key frame. In the authoring system concerning this example, when each key frame is arranged on a key frame channel, a motion which connects smoothly the pause described by each key frame is generated automatically by computer processing. Moreover, the center of gravity of 3D model can be set up by each key frame, and the motion on the appearance of 3D model can be made into the thing near the system.
[0223] Each key frame is arranged on a key frame channel so that the left end of a thumbnail may serve as time of day of a key frame. Moreover, by dragging a thumbnail to right and left along with a time-axis, it follows, and a key frame line can move and can change the time of day of the corresponding key frame. Moreover, telescopic motion of the key frame of the last pause turns into telescopic motion of the whole action time amount.
[0224] If a thumbnail is double-clicked, the pause edit window of the corresponding pause can open and a pause can be edited. However, an initial pause and the last pause are the outsides for edit, and even if it double-clicks these, a pause edit window is not opened. About the detail of a pause edit window, it explains in detail behind.
[0225] A motion channel is a field for meeting the time-axis which a time amount ruler specifies, and editing and displaying the contents of the motion.
[0226] In this example, switching operation is possible for a motion channel. The action edit window in the condition (motion detail channel) of having opened the motion channel is shown in drawing 14 . A motion is defined by actuation of each joint actuator which constitutes a mobile robot 1. By the motion channel, each timing chart which describes serial actuation of each joint actuator is listed in the shape of a tree according to biomodel (tree view).
[0227] The line graph on each timing chart shows the motion of the corresponding joint

actuator, i.e., the temporal response of angle of rotation.
[0228] By dragging the crossing point of key frame Rhine and the polygonal line up and down, the set point in the time amount concerned of the corresponding joint actuator can be returned. Moreover, as a result of such drag actuation, the pause applicable to key frame Rhine also changes, and renewal of automatic also of the contents of the key frame is carried out.
[0229] On a motion detail channel, a motion of each joint actuator can be visually grasped in the format of a timing chart. Moreover, direct drag-and-drop actuation is applicable to the polygonal line. Moreover, it is also possible to carry out copy actuation of the polygonal line about a certain joint actuator to other joint actuators. Therefore, the editing task of a motion file can be performed upwards intuitively, and an editing task is saved labor sharply. Moreover, regular actuation of symmetrical actuation etc. can be easily edited by copy actuation. Moreover, even if it is a motion of the same kind, motion data may be different with a difference (namely, difference of Hardware Configuration Information which consists of combination of a CPC component) of a mobile robot's 1 model. In such a case, data conversion is applied and you may make it reuse it as different data for models based on the proper data for every model.
[0230] A motion detail channel and its tree view scroll in a lengthwise direction at a longitudinal direction list to compensate for actuation of a perpendicular direction scroll bar in a horizontal scroll bar list.
[0231] A sound channel is a field for displaying sound data along with the time-axis which a time amount ruler specifies. In this example, from an action edit window, independent "sound detail window" can be opened and the sound data of a MIDI format can be edited by GUI actuation on this window. However, a sound detail window is explained later.
[0232] The sound ON/OFF check box is arranged by the sound channel. By putting a check into this check box, a sound can be sounded at the time of playback.
[0233] An LED actuation channel is a field for displaying LED actuation data along with the time-axis which a time amount ruler specifies. In this example, from an action edit window, independent "LED detail window" can be opened and the LED actuation data of a MIDI format can be edited by GUI actuation on this window. An LED detail window is explained later.
[0234] The sound ON/OFF check box is arranged by the LED actuation channel. By putting a check into this check box, LED actuation can be energized at the time of playback.
[0235] An action edit window can receive the drag-and-drop actuation from a project window (refer to drawing 6). That is, from a project window, a motion file, a sound file, an LED file, etc. can drag and drop each file used as the component of action directly, and can register it into an action window simply.
[0236] Moreover, an action edit window is MS. The drag-and-drop actuation from Windows Explorer can also be received. That is, from this Explorer window, a motion file, a sound file, an LED file, etc. can drag and drop each file used as the component of action directly, and can register it into an action window simply. The file registered into the action window is registered also into a project window by coincidence.
[0237] The configuration of the sound detail window for editing the sound file of a MIDI format is roughly shown in drawing 15 . This sound detail window consists of a title bar,

a menu bar, and an edit field that performs the editing task of a MIDI formal sound file by GUI actuation as illustration.
[0238] Each menu a "file", "edit", "a setup", and "a help" is prepared for the menu bar.
[0239] If a menu "a file" is chosen, the pull down menu which becomes a "new sound", "a sound being opened", "sound preservation", "sound new preservation", and a list from each sub menu of "closing" further will appear (refer to drawing 16).
[0240] Selection of a sub menu "a new sound" generates a new MIDI sound. When the non-saved MIDI sound is already opened, the dialog which carries out the prompt of the check of whether to save the MIDI sound to a user appears.
[0241] Selection of a sub menu "a sound is opened" opens the existing MIDI sound file. When the non-saved MIDI sound is already opened, the dialog which carries out the prompt of the check of whether to save the MIDI sound to a user appears (same as the above).
[0242] Selection of a sub menu "sound preservation" overwrites the corresponding MIDI sound file. In the case of a non-permanent file, like sound new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.
[0243] If a sub menu "sound new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0244] Selection of a sub menu "it closes" closes this sound detail window. When the sound file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0245] If a menu "edit" is chosen, the pull down menu which becomes "it returns", "cutoff", "copy", "overwrite attachment", "insertion attachment", and a list from each sub menu "deletion" further will appear (refer to drawing 17).
[0246] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0247] If a sub menu "cutoff" is chosen, when there is selected time amount width of face, the sound in the range will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is not lost but the information about the contents of the frame of it is lost.
[0248] When a sub menu "a copy" is chosen and there is selected time amount width of face, the sound in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0249] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0250] Selection of a sub menu "insertion attachment" carries out the insertion paste of the contents currently kept in the clipboard at current time of day.
[0251] If a sub menu "deletion" is chosen, when there is selected time amount width of face, the sound in the range will be deleted. The frame itself is not lost but the information on the contents of the frame of it is lost.
[0252] If a menu "a setup" is chosen, the pull down menu which becomes "the die length of a 4 section note" and a list from each sub menu "rhythm" further will appear (refer to drawing 18).
[0253] A sub menu "the die length of a quarter note" can have a sub menu (not shown) further, can mince it only in [of a quarter note] 1 minute, and can put in a number. The

die length set up here is displayed as a grid of the direction of a time-axis on a score.
[0254] A sub menu "rhythm" has the sub menu (not shown) which specifies a rhythm further. With the value set up here, the line which decides rhythm to be a time-axis grid on a score is drawn.
[0255] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0256] It returns to drawing 15 again and the edit field of the sound detail window for MIDI sounds is explained. This edit field is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. The inside of a time-line table consists of a time amount ruler, a key frame channel, a score channel, and a velocity channel.
[0257] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 15). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. Please refer to the above-mentioned [-one number] about the relation between the real time in a real-time display, and the display of a time amount ruler. Moreover, the unit of the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0258] Please refer to [Table 2] at the above-mentioned [Table 1] list about a width-of-face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) in a list at the time of a real-time display (however, a unit is set to sec).
[0259] The end time field and the current time stamp field other than a unit change radio carbon button are included in the time amount ruler. The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.
[0260] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (not shown) for changing spacing of a time amount ruler can be called.
[0261] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively. Key frame Rhine which shows the time of day of each key frame (after-mentioned) is displayed in the form which crosses each channel top, and a user can perform the editing task of a MIDI sound, checking the synchronization with a key frame visually. Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. Moreover, he is trying for current time-of-day Rhine which shows current time to display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current time of day to the location.
[0262] By the key frame channel, the key frame location acquired from the action edit window along with the time-axis which a time amount ruler specifies is displayed.

However, it is different from the case (refer to drawing 13) of the above-mentioned action edit window, and a key frame channel cannot be opened and closed in a sound detail window.
[0263] A score channel is a field for editing a MIDI sound by GUI actuation, and is constituted by a piano keyboard (however, the effective compass is different with a mobile robot's 1 model), and the basic grid of the direction of a time-axis.
[0264] With a piano keyboard, the maximum compass permitted by a mobile robot's 1 hardware specification etc. by the image display of a piano keyboard is displayed (or refreshable compass is displayed brightly and it may be made to indicate except [its] by gray). [0265] which displays absolute sound pitches, such as C3 and C4, on basic C key part The grid of the time amount width of face of the set-up quarter note is displayed on a score part. Moreover, Rhine of two grids (namely, two rhythm), three grids (three rhythm), and four grids (four rhythm) is emphasized with the value (above-mentioned) set up by rhythm.
[0266] On a score channel, a score is constituted by the height of a piano key with the sound length which becomes the criteria of a time-axis. One grid is called a "cel." A color is attached to a cel with a sound. However, in the case of the playback model of only one sound, a sound cannot be put on the scale from which it differs on the same time-axis.
[0267] Moreover, a click of an empty cel (that is, the color is not attached) places the sound of the die length of the note mark chosen. When a sound exists in other height on the same time amount, a sound replaces the clicked height. A click of the cel in which a sound already exists removes the sound.
[0268] Note marks, such as 16 diacritical marks, 8 diacritical marks, a quarter note, a half note, a whole note, dotted 8 diacritical marks, a dotted quarter note, and a dotted half note, are displayed on the field on the left-hand side of a piano keyboard. These note mark shall have an exclusive selection condition mutually, and only any one shall always be chosen. Moreover, a selection item changes with mouse click actuation.
[0269] A velocity channel is a field which displays the strength of the velocity for every sound. In the example shown in drawing 15 , although sound intensity is displayed with a bar graph, it may be displayed by the line graph. The sound intensity in each joint can be depended and adjusted to dragging the maximum upper limit of a bar graph. The maximum sound volume is set up by the default.
[0270] In addition, the "playback carbon button" which directs playback actuation of the edited sound is prepared for a sound detail channel, and a potato is good for it.
[0271] Moreover, the configuration of the sound detail window for displaying the sound file of a WAVE format is roughly shown in drawing 19 . A sound detail window consists of a title bar, a menu bar, and an edit field that edits a WAVE formal sound file as illustration.
[0272] Each menu a "file", "edit", and "a help" is prepared for the menu bar.
[0273] If a menu "a file" is chosen, the pull down menu which becomes "a sound is opened", "sound preservation", "sound new preservation", and a list from each sub menu of "closing" further will appear (refer to drawing 20).
[0274] Selection of a sub menu "a sound is opened" opens the existing WAVE sound file. When the non-saved WAVE sound is already opened, the dialog which carries out the prompt of the check of whether to save the WAVE sound to a user appears.
[0275] Selection of a sub menu "sound preservation" overwrites the corresponding

WAVE sound file. Moreover, if a sub menu "sound new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0276] Selection of a sub menu "it closes" closes this sound detail window. When the sound file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0277] If a menu "edit" is chosen, the pull down menu which becomes "it returns", "cutoff", "copy", "overwrite attachment", "insertion attachment", and a list from each sub menu "deletion" further will appear (refer to drawing 21).
[0278] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0279] If a sub menu "cutoff" is chosen, when there is selected time amount width of face, the sound in the range will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is lost and back is got blocked.
[0280] When a sub menu "a copy" is chosen and there is selected time amount width of face, the sound in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0281] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0282] Selection of a sub menu "insertion attachment" carries out the insertion paste of the contents currently kept in the clipboard at current time of day.
[0283] If a sub menu "deletion" is chosen, when there is selected time amount width of face, the sound in the range will be deleted. The frame itself is not lost but the part will be in a silent condition.
[0284] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0285] The edit field of the sound detail window for WAVE sounds is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. the inside of a time-line table -- a time amount ruler, a key frame channel, and a WAVE channel -- ** -- it is constituted.
[0286] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 15). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. Please refer to the above-mentioned [-one number] about the relation between the real time in a real-time display, and the display of a time amount ruler. Moreover, the unit of the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0287] Please refer to [Table 2] at the above-mentioned [Table 1] list about a width-of-face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) in a list at the time of a real-time display (however, a unit is set to sec).
[0288] The time amount ruler includes the end time field and the current time stamp field other than a unit change radio carbon button.
[0289] The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of

illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.
[0290] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (not shown) for changing spacing of a time amount ruler can be called.
[0291] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively.
[0292] Key frame Rhine which shows the time of day of each key frame (after-mentioned) is displayed in the form which crosses each channel top, and a user can perform the editing task of a WAVE sound, checking the synchronization with a key frame visually. Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. Moreover, he is trying for current time-of-day Rhine which shows current time to display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current time of day to the location.
[0293] By the key frame channel, the key frame location acquired from the action edit window along with the time-axis which a time amount ruler specifies is displayed. However, it is different from the case (refer to drawing 13) of the above-mentioned action edit window, and a key frame channel cannot be opened and closed in a sound detail window.
[0294] As shown in drawing 19 , the contents of the sound file of a WAVE format are expressed as a WAVE channel as a wave. However, it is different from the score channel for MIDI formats (above-mentioned), and only fundamental patching actuation is permitted on the WAVE channel.
[0295] In addition, the "playback carbon button" which directs playback actuation of the edited sound is prepared for a sound detail channel, and a potato is good for it.
[0296] Moreover, the configuration of the LED detail window for displaying and editing into drawing 22 the LED actuation file described in the MIDI format is shown roughly. A sound detail window consists of a title bar, a menu bar, and an edit field that edits a WAVE formal LED actuation file as illustration.
[0297] Each menu a "file", "edit", and "a help" is prepared for the menu bar.
[0298] If a menu "a file" is chosen, the pull down menu which becomes "new LED actuation", "LED actuation being opened", "LED actuation preservation", "LED actuation new preservation", and a list from each sub menu of "closing" further will appear (refer to drawing 23).
[0299] Selection of a sub menu "new LED actuation" generates new LED actuation. When non-saved LED actuation is already opened, the dialog which carries out the prompt of the check of whether to save the LED actuation to a user appears.
[0300] Selection of a sub menu "LED actuation is opened" opens existing LED actuation and file. When non-saved LED actuation is already opened, the dialog which carries out the prompt of the check of whether to save the MIDI sound to a user appears (same as the above).
[0301] Selection of a sub menu "LED actuation preservation" overwrites the

corresponding LED actuation file. In the case of a non-permanent file, like LED actuation new preservation (after-mentioned), a file setting dialog appears and the prompt of the input of a file name is carried out to a user.
[0302] If a sub menu "LED actuation new preservation" is chosen, a file setting dialog will appear and the prompt of the input of a file name will be carried out to a user.
[0303] Selection of a sub menu "it closes" closes this LED actuation detail window. When the LED actuation file in this window has not been saved, a dialog appears and the prompt of the check of whether to save this is carried out to a user.
[0304] If a menu "edit" is chosen, the pull down menu which becomes "it returns", "cutoff", "copy", "overwrite attachment", "insertion attachment", and a list from each sub menu "deletion" further will appear (refer to drawing 17).
[0305] Selection of a sub menu "it returns" performs undo processing sequentially from the latest actuation.
[0306] If a sub menu "cutoff" is chosen, when there is selected time amount width of face, LED actuation in the range will be cut. The cut data are temporarily kept in a clipboard in fact. By cut processing, the frame itself is not lost but the information about the contents of the frame of it is lost.
[0307] When a sub menu "a copy" is chosen and there is selected time amount width of face, LED actuation in the range is copied. The copied data are temporarily kept in a clipboard in fact.
[0308] Selection of a sub menu "overwrite attachment" pastes the contents currently kept in the clipboard on current time of day.
[0309] Selection of a sub menu "insertion attachment" carries out the insertion paste of the contents currently kept in the clipboard at current time of day.
[0310] If a sub menu "deletion" is chosen, when there is selected time amount width of face, LED actuation in the range will be deleted. The frame itself is not lost but the information on the contents of the frame of it is lost.
[0311] Moreover, sub menus, such as a topic, and a support web, version information, are contained in the menu "a help."
[0312] It returns to drawing 22 again and the edit field of an LED detail window is explained. This edit field is the table of the two-dimensional time-line format which consists of a lateral time-axis and a channel of a lengthwise direction. The inside of a time-line table consists of a time amount ruler, a key frame channel, and a score channel.
[0313] A time amount ruler can change the frame number display with a real-time display using a unit change radio carbon button (the real-time display is chosen in the example shown in drawing 22). The unit of the graduation of a real-time display is considered as a second:ms (double figures each) display. Please refer to the above-mentioned [-one number] about the relation between the real time in a real-time display, and the display of a time amount ruler. Moreover, the unit of the graduation of the time amount ruler of a frame number display displays a frame number by 4 figures. The 9999 greatest frames become about 160 seconds.
[0314] Please refer to [Table 2] at the above-mentioned [Table 1] list about a width-of-face setup of the frame on the screen in each case at the time of a frame number display (however, a unit is set to f) in a list at the time of a real-time display (however, a unit is set to sec).
[0315] The time amount ruler includes the end time field and the current time stamp field

other than a unit change radio carbon button. The time-of-day numeric value which shows the end time (namely, operating time) of action under edit is displayed on the end time field (in the example of illustration, "09:40" (=9 second 40) is displayed). Moreover, the time-of-day numeric value of a current location is displayed on the current time stamp field (in the example of illustration, "04:60" (=4 second 60) is displayed). If the time-of-day figure which is the text field which can be edited and is meaningful is inputted, it becomes end time, the last key frame will move or current time of day will move these fields to the location.

[0316] Moreover, on a time amount ruler, the "time amount width-of-face modification pop up menu" (not shown) for changing spacing of a time amount ruler can be called.

[0317] In an edit field, "key frame Rhine", and "last time stamp Rhine" and "current time-of-day Rhine" are displayed as time stamp Rhine, respectively. Key frame Rhine which shows the time of day of each key frame (after-mentioned) is displayed in the form which crosses each channel top, and a user can perform the editing task of the LED actuation described in the MIDI format, checking the synchronization with a key frame visually. Moreover, since he is trying for end time Rhine which shows the end time of action under edit to display each channel top in the crossing form, a user can understand visually the range of the time amount used as the candidate for edit. Moreover, he is trying for current time-of-day Rhine which shows current time to display each channel top in the crossing form. Fundamentally, a click of on one of channels moves current time of day to the location.

[0318] The key frame location acquired from the action edit window along with the time-axis which a time amount ruler specifies is expressed as a key frame channel. However, it is different from the case (refer to drawing 13) of the above-mentioned action edit window, and a key frame channel cannot be opened and closed in an LED detail window.

[0319] A score channel is a field for editing the LED actuation described by GUI actuation in a MIDI format, and is constituted by the list of parts which have arranged LED on mobile-robot 1 body, and the basic grid of the direction of a time-axis. In this example, LED is arranged at least at each part of **** (******), a right eye alpha and a left eye alpha, a right eye beta, a left eye beta, a right eye gamma, a left eye gamma, a tail alpha, and a tail beta.

[0320] On a score channel, the score for every list is constituted at least for each part by displaying the lighting situation of LED like each part on a time-axis. One grid is called a "cel." The color and the color according to lighting reinforcement are attached to the cel of the location equivalent to the part which LED turns on on a time-axis. It is different from the score channel (refer to the above-mentioned and drawing 15) which edits a MIDI sound, and luminescence/putting out lights of LED like each part can be done independently.

[0321] It is shown in the left of a score channel the LED part visual ** table. This carries out the graphic expression only of each part of LED which can be changed.

[0322] Moreover, the velocity mark is displayed on as visual a lower part as the LED section. A velocity mark is a mark which displayed classes, such as a rise, a high-end keeping, and descent. These marks shall have an exclusive selection condition mutually, and one shall always be chosen by something. Moreover, a selection item changes with mouse clicks.

[0323] The authoring system concerning this example is preparing the preview window,

in order to check visually the contents of action edited on the above-mentioned action edit window.
[0324] The configuration of a preview window is roughly shown in drawing 25 . As shown in this drawing, a preview window consists of a "3D view", and the "current time-of-day field" and a "playback carbon button group". [a "3D display change carbon button group", and]
[0325] The three-dimension mobile robot's 1 image generated by computer graphics processing is always displayed on 3D view. By dragging on this view, the direction of a look can be moved and how a view appears can be changed. Moreover, although not illustrated, you may constitute so that 3D model can be previewed from two or more views to coincidence. Moreover, a motion of a view is interlocked with the user input actuation on a 3D display change carbon button group. Moreover, in case creation processing of the 3D display of a motion is carried out, at least each part is equipped with the collision (collision) of comrades, or the check function of the drive rate of each joint with 3D model. Moreover, the center of gravity of 3D model can be set up by each key frame, and the motion on the appearance of 3D model can be made into the thing near the system.
[0326] Moreover, the LED actuation preview field for displaying LED actuation is arranged in the right-hand side of 3D view. In this preview field, it is made to synchronize with a motion of the mobile robot 1 on 3D view mentioned above, and signs that a mobile robot's 1 LED blinks are displayed.
[0327] Each carbon button "rotation", "zoom-in/out", a "pan", and a "home location" is arranged in the 3D display change carbon button group. A user can change the direction of a look in 3D view by carrying out click actuation of these carbon buttons.
[0328] For example, if a rotation carbon button is clicked, it will become rotation mode, and if 3D view is dragged henceforth, the mobile robot 1 in 3D view will rotate.
[0329] Moreover, if zoom-in / out carbon button is clicked, it will become zoom mode, and if 3D view is dragged up and down henceforth, the mobile robot 1 in 3D view will do zoom-in/out.
[0330] moreover -- if 3D view will become panmode if a pancarbon button is clicked, and 3D view is dragged vertically and horizontally henceforth -- 3D view -- a pan -- that is, high-speed migration is carried out.
[0331] Moreover, if a home location carbon button is clicked, a mobile robot's 1 three-dimensional display will return to the condition of having seen from the default view of a look, i.e., default direction.
[0332] The current time of day of the contents of drawing currently displayed on 3D view is displayed on the current time-of-day field (current time-of-day"04:60" is displayed in the example shown in this drawing). If the alphabetic character this field has a meaning as time of day is inputted, the display of 3D view will change to the frame of the corresponding time of day. Moreover, the time-of-day location of KARENTO is relatively indicated by visual.
[0333] Each carbon button "rewinding [of a frame]", "a front key frame", "a play/stop", "coma delivery of a frame", "frame delivery", and "loop-formation playback" is arranged in the playback carbon button group.
[0334] If it clicks "rewinding [of a frame]", the display of 3D view will return to the first frame. If "a front key frame" is clicked, the display of 3D view will fly to the last key

frame from a current location. Moreover, a click of "a play/stop" starts or suspends playback of 3D view display (during a play, a play/stop button is stopped and acts as a play during a stop). Moreover, if "coma delivery of a frame" is effective only during playback of 3D view display and it is clicked, coma delivery of one frame will be carried out. Moreover, a click of "frame delivery" advances the display of 3D view to the last frame. Moreover, a click of "loop-formation playback" carries out loop-formation playback of the display of 3D view.

[0335] Moreover, the authoring system concerning this example is preparing the pause window, in order to edit a mobile robot's 1 three-dimension-pause by GUI actuation which makes a drag the keynote.

[0336] The pause edited on a pause window can be used as a key frame which constitutes a motion. For example, this pause window can be started by double-clicking a desired key frame on a key frame channel.

[0337] The configuration of a pause window is roughly shown in drawing 26 . On this pause window, angle of rotation of each joint actuator which constitutes a mobile robot 1 is directly directed by GUI actuation, and a desired pause can be specified simply. A pause window consists of a stereo viewing area, the list appointed field, a set point field, a 3D viewing area, a 3D display change carbon button group, and display change pop up.

[0338] A mobile robot's 1 expansion top view is displayed, and a user is made to choose the part which can be edited in the stereo appointed field. the item of list assignment chooses the selected part -- having -- a 3D display top -- highlighting -- or it blinks and the contents of set point area change.

[0339] In the list appointed field, a mobile robot's 1 part which can be edited and the set point are displayed as a list. if a user chooses a specific part out of this list, in the stereo appointed field, the corresponding part will carry out highlighting -- having -- 3D viewing area -- highlighting -- or it blinks and the contents of the set point field change.

[0340] In the set point field, a list indication of the maximum is given at the setting part name of each part which can be edited, the set point, and the minimum value list that can be set up. If a specific part with a user is chosen, the contents will change. The set point can be keyed directly in the field which can be inputted. The expression of an include angle can be considered as a radii expression, and the set point can be changed by dragging Rhine for assignment.

[0341] In 3D viewing area, a mobile robot's 1 whole body image generated by 3D graphics is drawn with the ground. A user can choose that part by clicking the part which corresponds from this 3D display, and highlighting of the selection part is carried out. Furthermore, the set point can be directly changed by dragging a selection part.

[0342] The contents of a display in 3D viewing area are being interlocked with the 3D display change carbon button, and can change by dragging the view top of this 3D viewing area, the way of a look, i.e., direction, a view appears.

[0343] Each carbon button "rotation", "zoom-in/out", a "pan", and a "home location" is arranged in the 3D display change carbon button group. A user can change the direction of a look in 3D viewing area by carrying out click actuation of these carbon buttons.

[0344] For example, if a rotation carbon button is clicked, it will become rotation mode, and if 3D viewing area is dragged henceforth, the mobile robot 1 in 3D viewing area will rotate. Moreover, if zoom-in / out carbon button is clicked, it will become zoom mode, and if 3D viewing area is dragged up and down henceforth, a mobile robot 1 will do

zoom-in/out within 3D viewing area. moreover -- if it will become panmode if a pancarbon button is clicked, and 3D viewing area is dragged vertically and horizontally henceforth -- the inside of 3D viewing area -- a mobile robot 1 -- a pan -- that is, high-speed migration is carried out. Moreover, if a home location carbon button is clicked, a mobile robot's 1 three-dimensional display will return to the condition of having seen from [default] the look.

[0345] Moreover, by clicking a carbon button, the pop up menu (not shown) which consists of a transverse plane / tooth back / right lateral / left lateral / top face / a base / 3D is displayed, and display change pop up is changed to a view from the direction chosen by menu selection.

[0346] The "O.K." carbon button and "cancellation" carbon button are prepared for the pause window. If the O.K. carbon button is clicked, all the edit items in this window will be confirmed, and this window will be closed. On the other hand, if a Cancel button is clicked, all edit items will be made into an invalid and this window will be closed (common knowledge).

[0347] In addition, a pause window can be used, not only when editing a mobile robot's 1 pause on an authoring system but when using it in order to read into a system the joint value of the posture, i.e., each joint actuator, instilled to the mobile robot 1 according to the activity of direct teaching real on a plane etc. and to preview it.

[0348] In the form of the flow chart shows the procedure for previewing the contents which carried out direct teaching on the system on a pause window to drawing 27 . Hereafter, it explains according to this flow chart.

[0349] First, a mobile robot's 1 operator holds a fuselage, each leg, etc. by hand on the system, makes it take a desired pause, and performs direct teaching (step S1).

[0350] Subsequently, the set point in parts which can be edited, such as each joint actuator obtained as a result of this direct teaching, is read, and it once saves (step S2), and, subsequently to an authoring system, transmits (step S3).

[0351] Especially the data transfer approach to an authoring system is not asked. For example, contiguity wireless data transmission like Bluetooth may be used, and it may be made to move data between equipment through archive media, such as a memory stick.

[0352] In an authoring system side, if the set point of the part which can be edited is read (step S4), the contents of a display and the contents of drawing will be updated (step S5). [in / the pause window mentioned above is opened, on the other hand, it in the actual condition appointed field, the list appointed field and set point area as the read set point, and / to a list / 3D viewing area]

[0353] Moreover, the authoring system concerning this example is preparing the motion pre viewer for previewing the motion edited by the motion channel (above-mentioned), or the motion which used as the key frame each pause edited by the POVU window.

[0354] The configuration of a motion pre viewer is roughly shown in drawing 28 . This motion pre viewer is opened by double-clicking the motion file shown for example, in the project window the tree table.

[0355] On a motion pre viewer, while previewing a motion, in order to paste on an action edit window, a pause can be copied.

[0356] In a motion pre viewer, the thumbnail of one or more key frames, i.e., a pause, which constitute a motion is displayed. The array of a key frame follows the time series for example, at the time of motion playback.

[0357] The key frame in a motion pre viewer can be dragged to an action edit window. Moreover, when there are many key frames which constitute the motion under preview and it is not settled in a window, it is made to carry out horizontal scrolling.
[0358] It has explained in detail about this invention, referring to a specific example more than [addenda]. However, it is obvious that this contractor can accomplish correction and substitution of this example in the range which does not deviate from the summary of this invention.
[0359] Although explained in detail in this example about the authoring system which mentions as an example the pet mold robot which performs quadrapedalism which imitated the dog, and starts this invention, the summary of this invention is not limited to this. for example, a leg formula mobile robot of 2 pairs of shoes like a humanoid robot -- or please understand enough that this invention is applicable similarly also to migration mold robots other than a leg formula.
[0360] Moreover, the "multi-Seki nodal character object" indicated by the column of the [claim] of this specification is not limited to a physical machinery like many articulated robots including a leg formula robot. For example, it is also possible to apply the authoring system which starts this invention for creation and edit of the operating sequence of the animation using the character generated by computer graphics.
[0361] In short, with the gestalt of instantiation, this invention has been indicated and it should not be interpreted restrictively. In order to judge the summary of this invention, the column of the claim indicated at the beginning should be taken into consideration.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing having shown the appearance configuration of the mobile robot 1 which performs the leg formula walk by the limbs with which operation is presented in this invention.
[Drawing 2] It is drawing having shown typically the block diagram of the electrical and electric equipment and control network of a mobile robot 1.
[Drawing 3] It is drawing having shown the configuration of a control section 20 in the detail further.
[Drawing 4] It is drawing having shown typically the example of a hardware configuration of a host computer 100.

[Drawing 5] It is drawing having shown typically the whole authoring system configuration concerning this example.
[Drawing 6] It is drawing having shown the project window.
[Drawing 7] It is drawing having shown the sub menu item of the menu in a project window "a file."
[Drawing 8] It is drawing having shown the sub menu item of the menu in a project window "a material."
[Drawing 9] It is drawing having shown the action edit window.
[Drawing 10] It is drawing having shown the sub menu item of the menu in an action edit window "a file."
[Drawing 11] It is drawing having shown the sub menu item of the menu in an action edit window "edit."
[Drawing 12] It is drawing having shown the sub menu item of the menu in an action edit window "a material."
[Drawing 13] It is drawing having shown the action edit window in the condition (key frame detail channel) of having opened the key frame channel.
[Drawing 14] It is drawing having shown the action edit window in the condition (motion detail channel) of having opened the motion channel.
[Drawing 15] It is drawing having shown the sound detail window for editing the sound file of a MIDI format.
[Drawing 16] It is drawing having shown the sub menu item of the menu in the sound detail window for MIDI formats "a file."
[Drawing 17] It is drawing having shown the sub menu item of the menu in the sound detail window for MIDI formats "edit."
[Drawing 18] It is drawing having shown the sub menu item of the menu in the sound detail window for MIDI formats "a setup."
[Drawing 19] It is drawing having shown roughly the configuration of the sound detail window for displaying the sound file of a WAVE format.
[Drawing 20] It is drawing having shown the sub menu item of the menu in the sound detail window for WAVE formats "a file."
[Drawing 21] It is drawing having shown the sub menu item of the menu in the sound detail window for WAVE formats "edit."
[Drawing 22] It is drawing having shown roughly the configuration of the LED detail window for displaying an LED actuation file.
[Drawing 23] It is drawing having shown the sub menu item of the menu in an LED detail window "a file."
[Drawing 24] It is drawing having shown the sub menu item of the menu in an LED detail window "edit."
[Drawing 25] It is drawing having shown roughly the configuration of the preview window for carrying out the monitor of the action edited in the action edit window.
[Drawing 26] It is drawing having shown roughly the configuration of the pause window for editing a mobile robot's 1 3D pause by GUI actuation.
[Drawing 27] It is the flow chart which showed the procedure for previewing the contents which carried out direct teaching on the system on a pause window.
[Drawing 28] It is drawing having shown roughly the configuration of the motion pre viewer for previewing a motion.

[Drawing 29] It is the block diagram having shown the functional configuration of an authoring system.

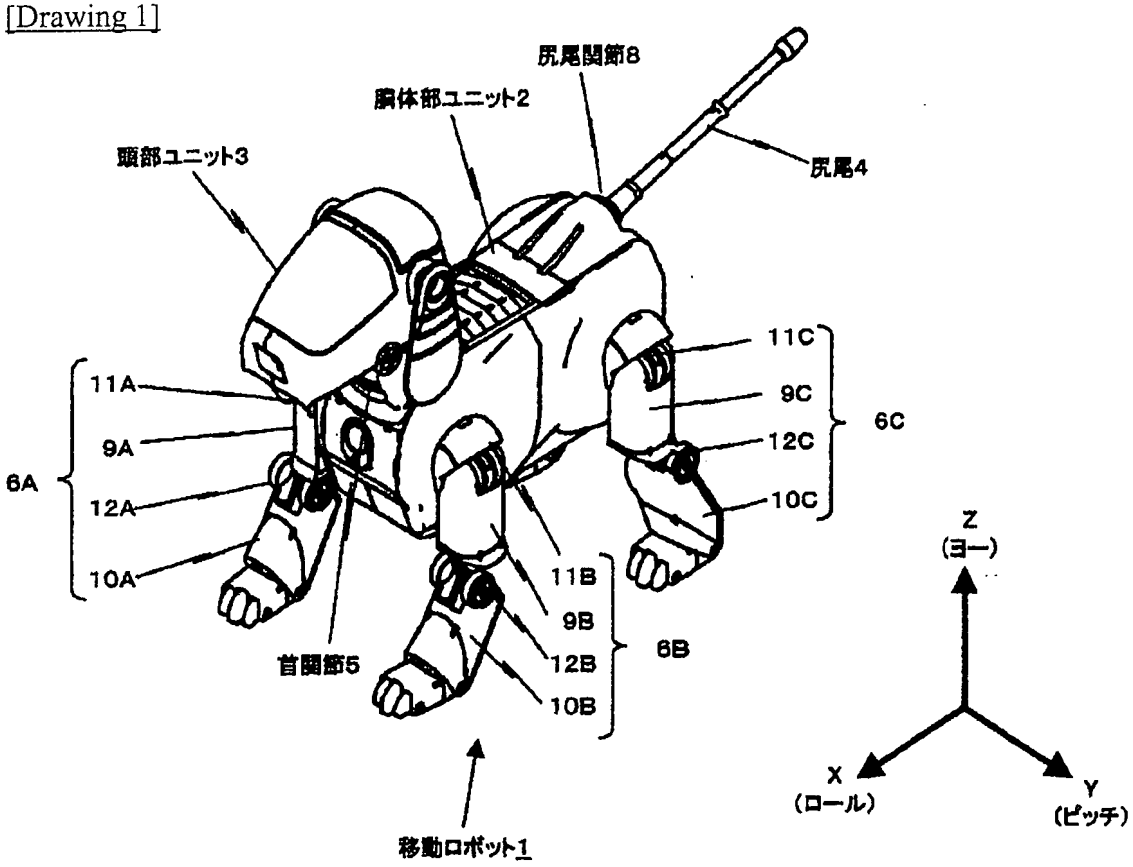
[Description of Notations]

1 -- Mobile robot
2 -- Idiosoma unit
3 -- Head unit
4 -- Tail
6A-6D -- Leg unit
7 -- Neck joint
8 -- Tail joint
9A-9D -- Femoral region unit
10A-10D -- Leg part unit
11A-11D -- Hip joint
12A-12D -- Knee joint
15 -- CCD camera
16 -- Microphone
17 -- Loudspeaker
18 -- Touch sensor
19 -- LED indicator
20 -- Control section
21 -- CPU
22 -- RAM
23 -- ROM
24 -- Nonvolatile memory
25 -- Interface
26 -- Radio interface
27 -- Network Interface Card
28 -- Bus
29 -- Keyboard
40 -- I/O section
50 -- Mechanical component
51 -- Motor
52 -- Encoder
53 -- Driver

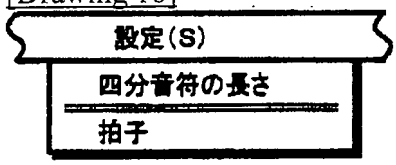
[Translation done.]

DRAWINGS

[Drawing 1]

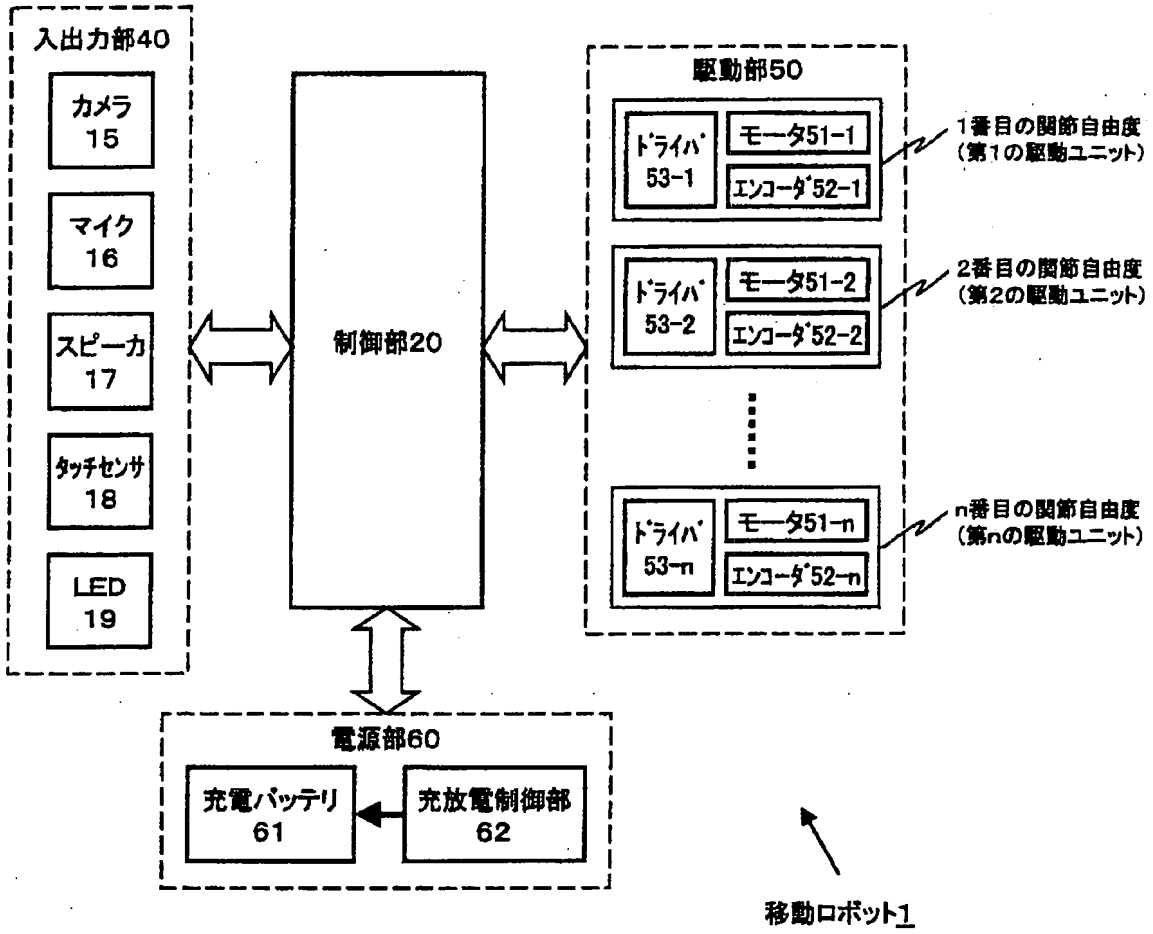


[Drawing 18]

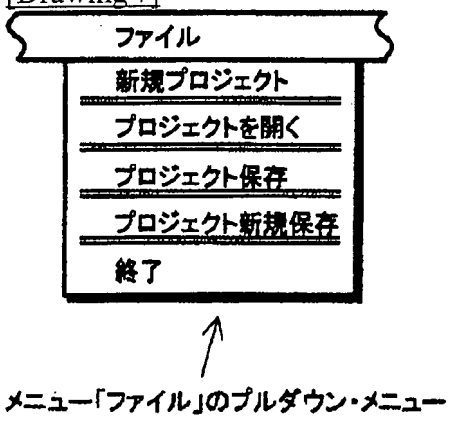


メニュー「設定」のプルダウン・メニュー

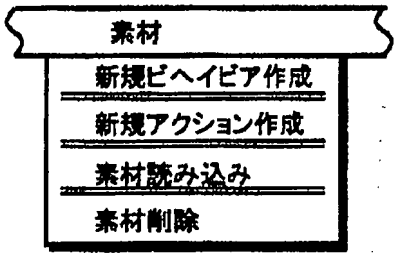
[Drawing 2]



[Drawing 7]

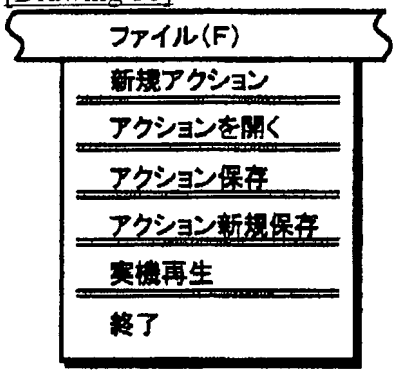


[Drawing 8]



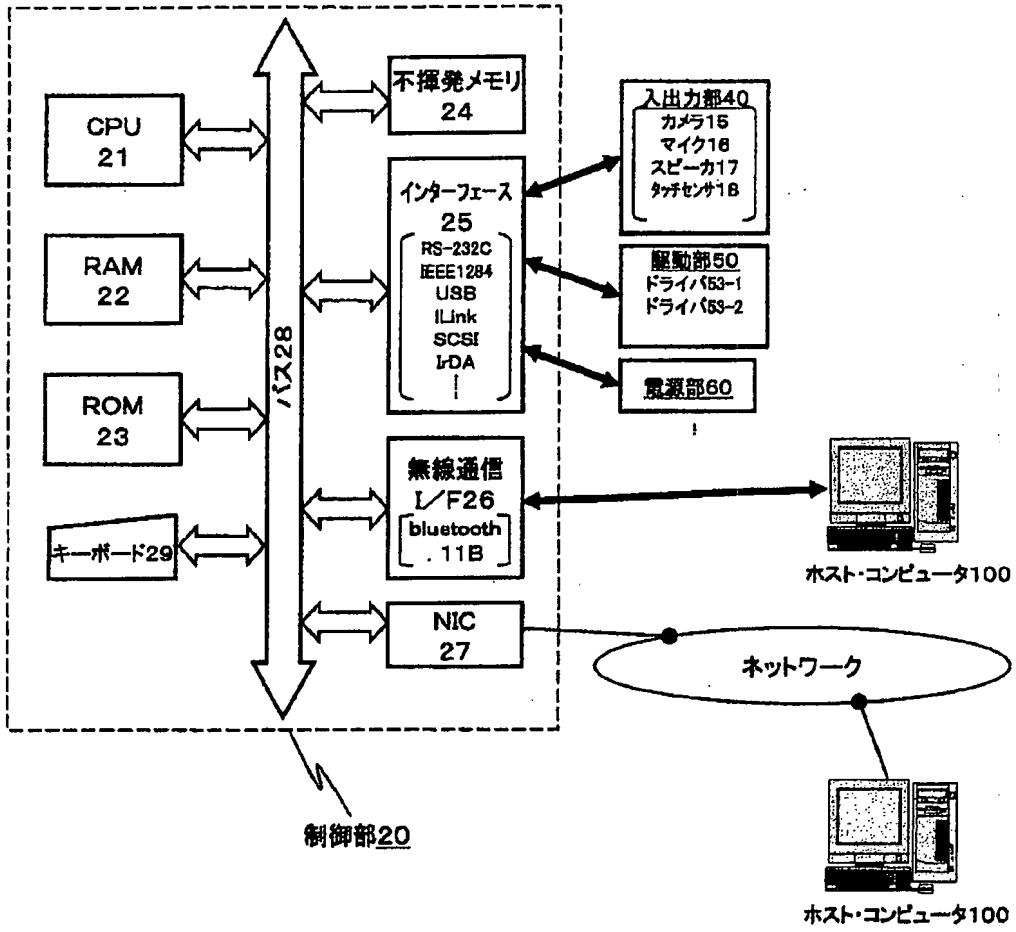
メニュー「素材」のプルダウン・メニュー

[Drawing 10]

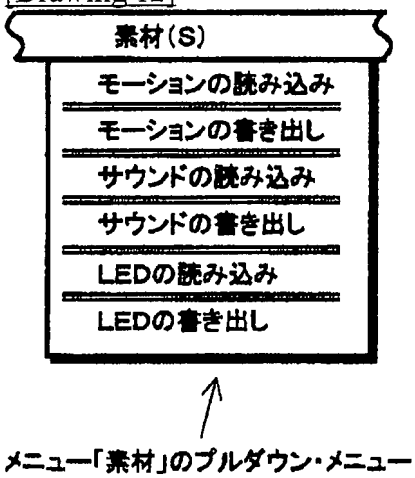


メニュー「ファイル」のプルダウン・メニュー

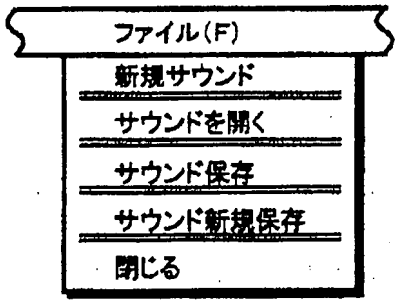
[Drawing 3]



[Drawing 12]

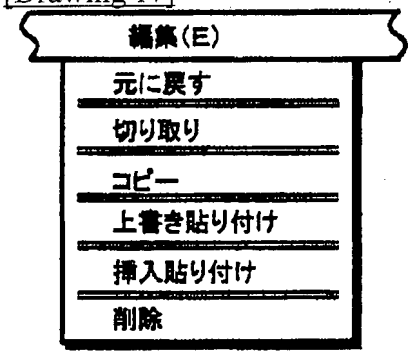


[Drawing 16]



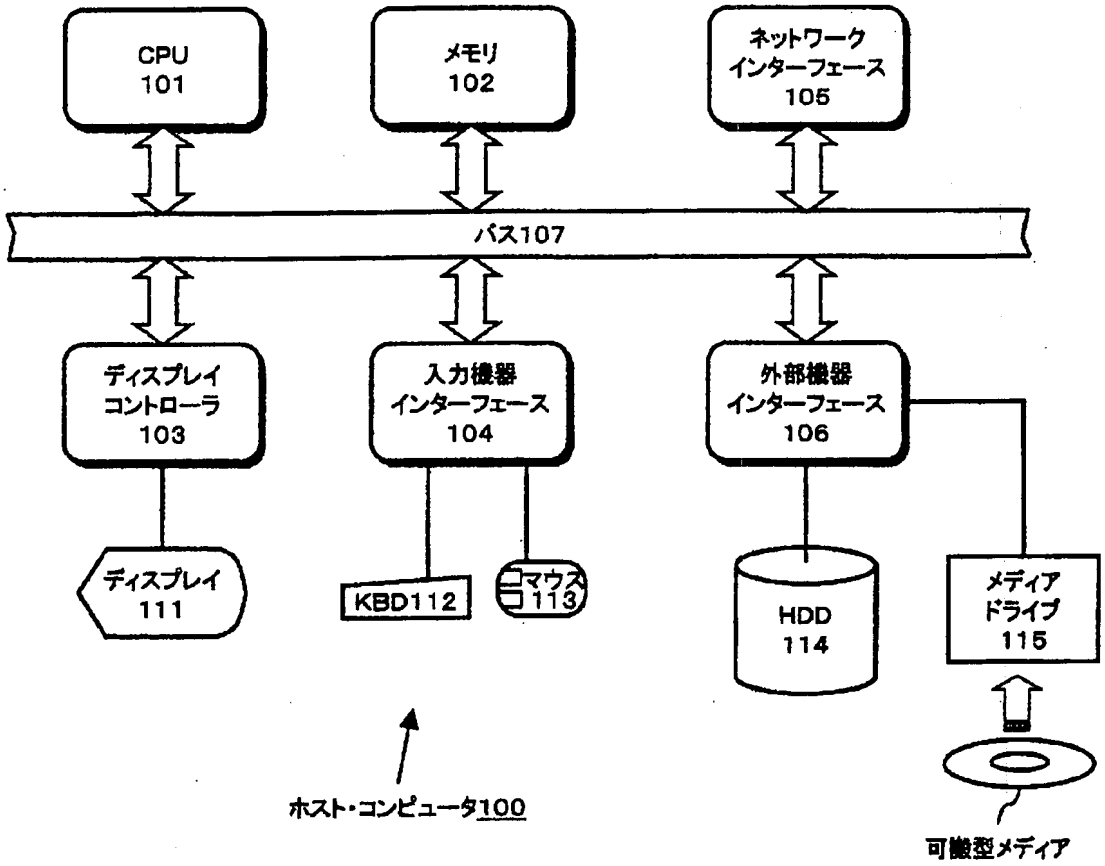
メニュー「ファイル」のプルダウン・メニュー

[Drawing 17]

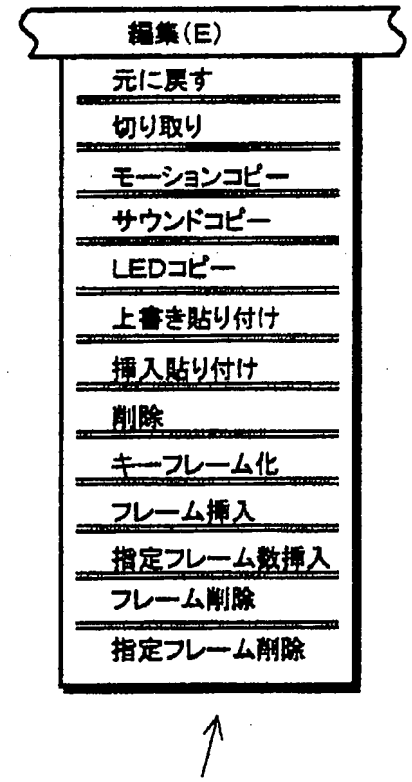


メニュー「編集」のプルダウン・メニュー

[Drawing 4]

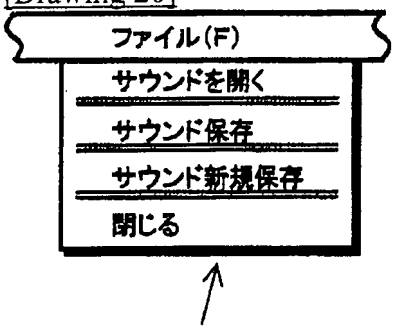

CPU
101
メモリ
102
ネットワーク
インターフェース
105
バス107
ディスプレイ
コントローラ
103
入力機器
インターフェース
104
外部機器
インターフェース
106
ディスプレイ
111
KBD112
マウス
113
HDD
114
メディア
ドライブ
115
ホスト・コンピュータ100
可搬型メディア

[Drawing 11]



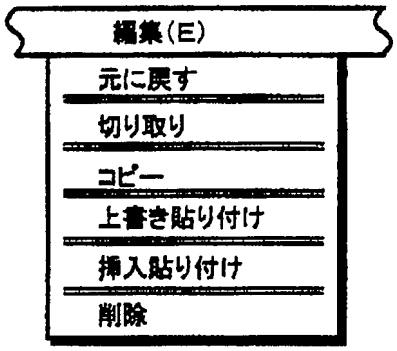
メニュー「編集」のプルダウン・メニュー

[Drawing 20]



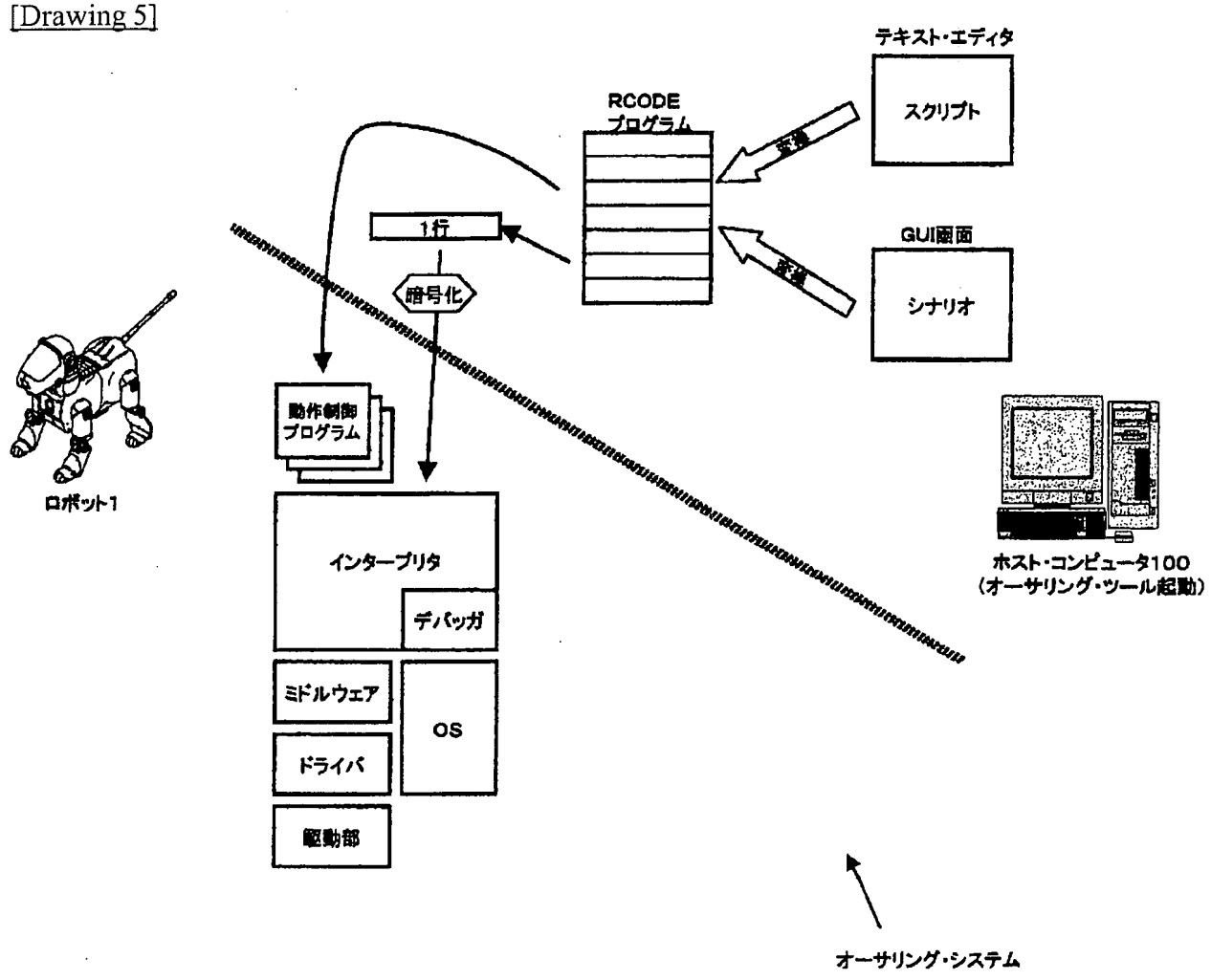
メニュー「ファイル」のプルダウン・メニュー

[Drawing 21]

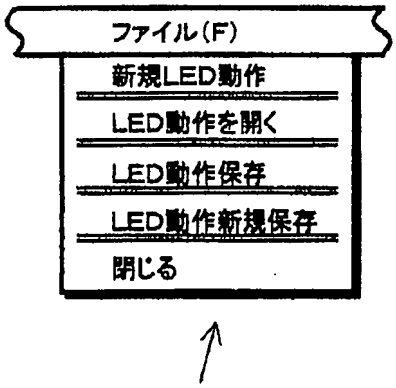


メニュー「編集」のプルダウン・メニュー

[Drawing 5]

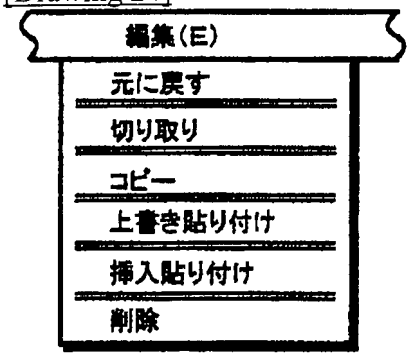


[Drawing 23]



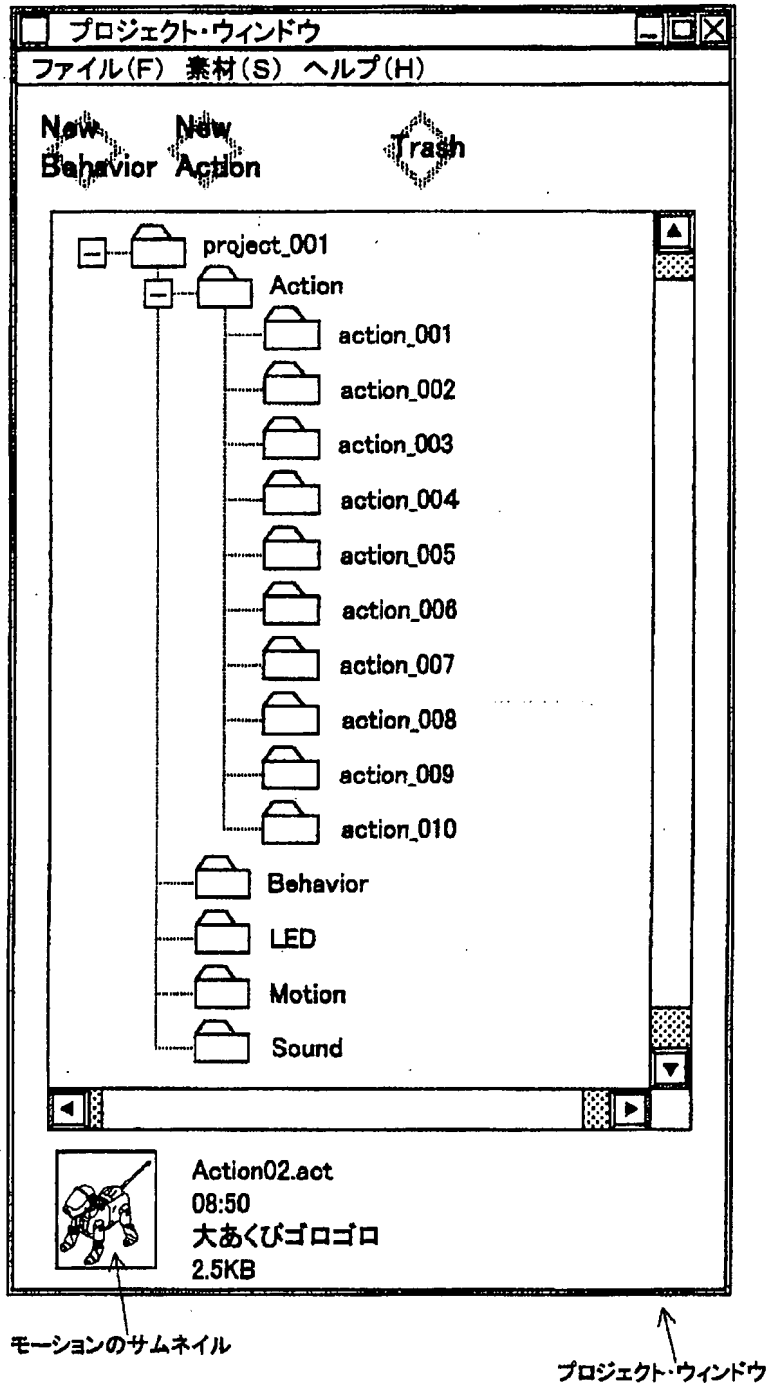
メニュー「ファイル」のプルダウン・メニュー

[Drawing 24]



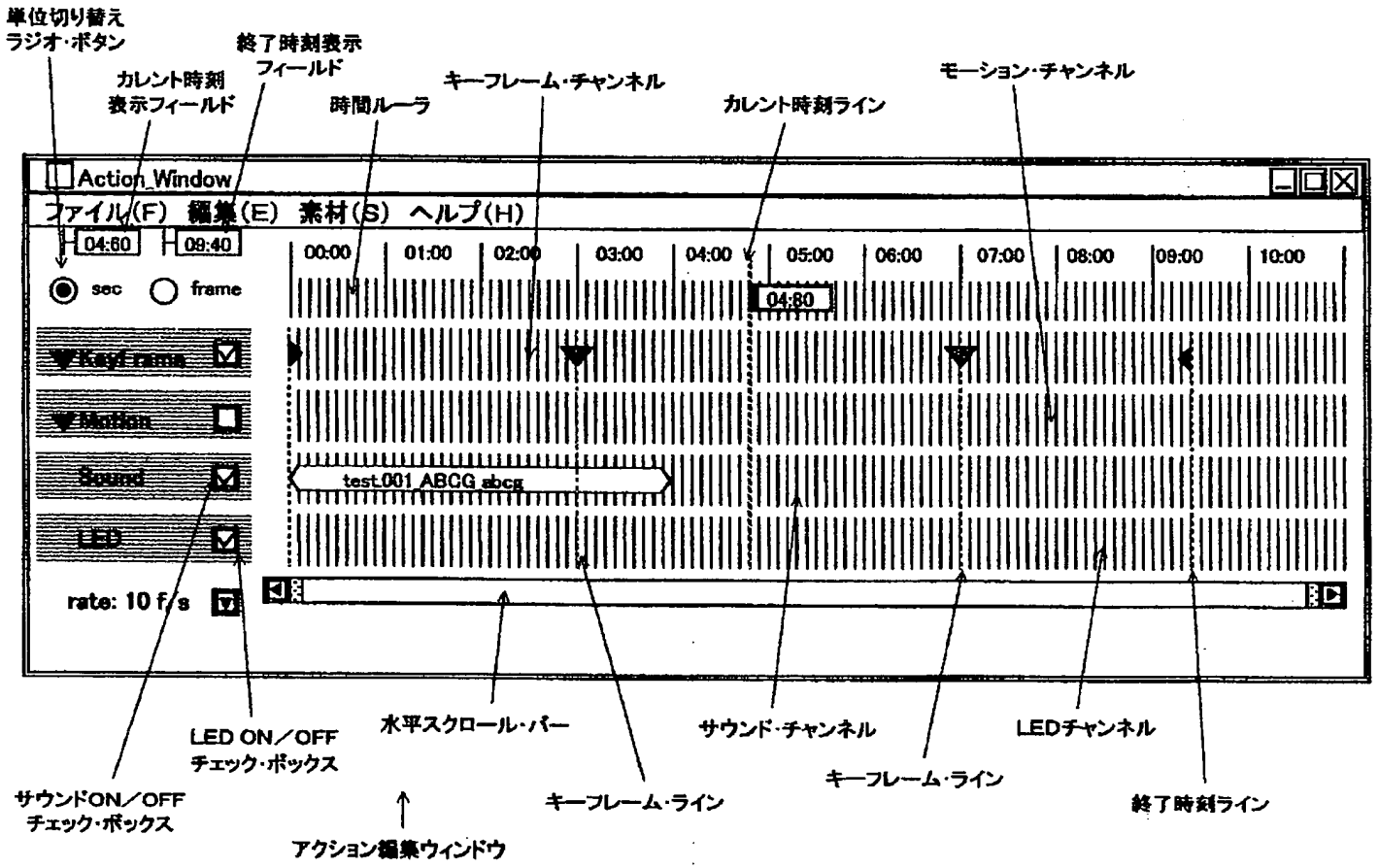
メニュー「編集」のプルダウン・メニュー

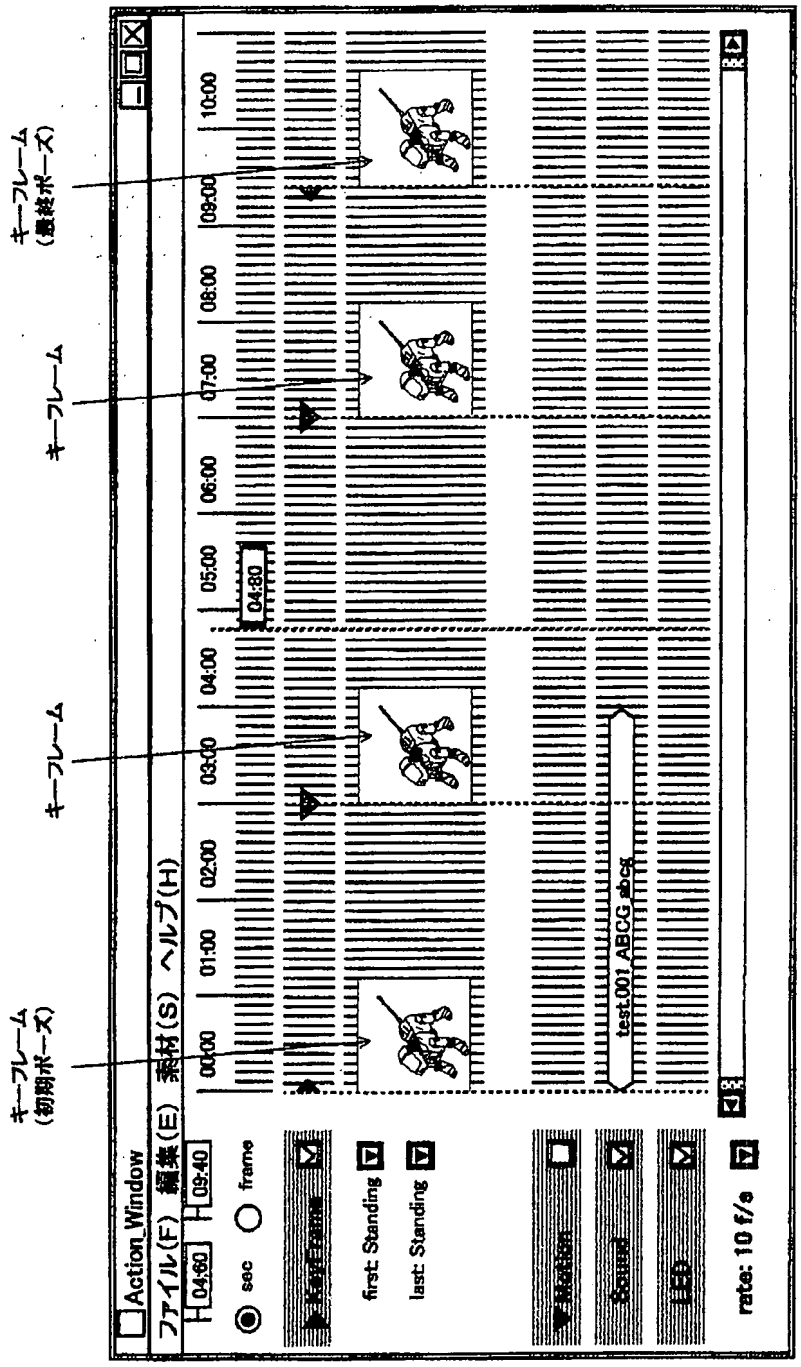
[Drawing 6]


プロジェクト・ウィンドウ
ファイル(F) 素材(S) ヘルプ(H)
New Behavior
New Action
Trash
project_001
Action
action_001
action_002
action_003
action_004
action_005
action_006
action_007
action_008
action_009
action_010
Behavior
LED
Motion
Sound
Action02.act
08:50
大あくびゴロゴロ
2.5KB
モーションのサムネイル
プロジェクト・ウィンドウ

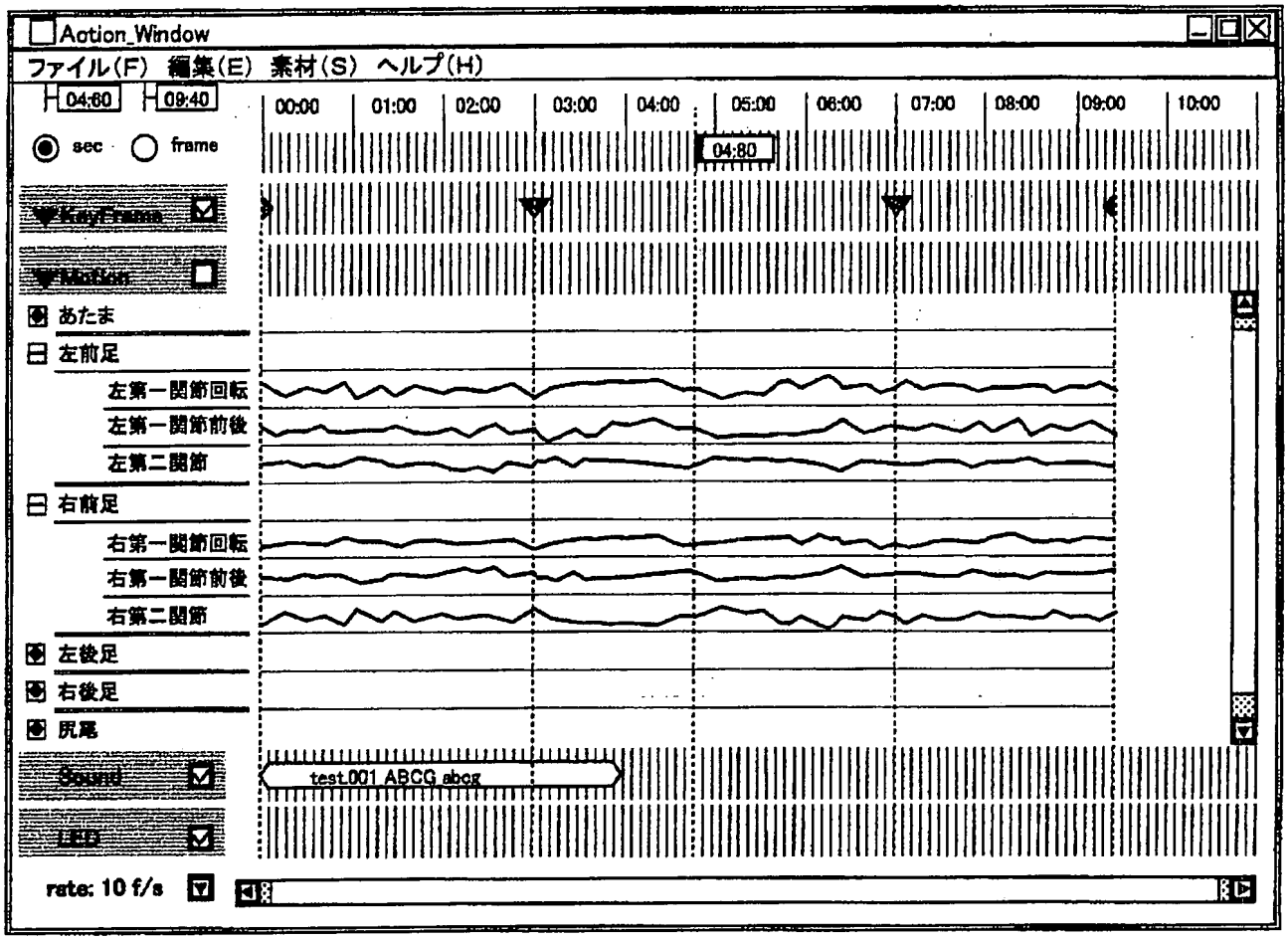
[Drawing 9]

[Drawing 13]

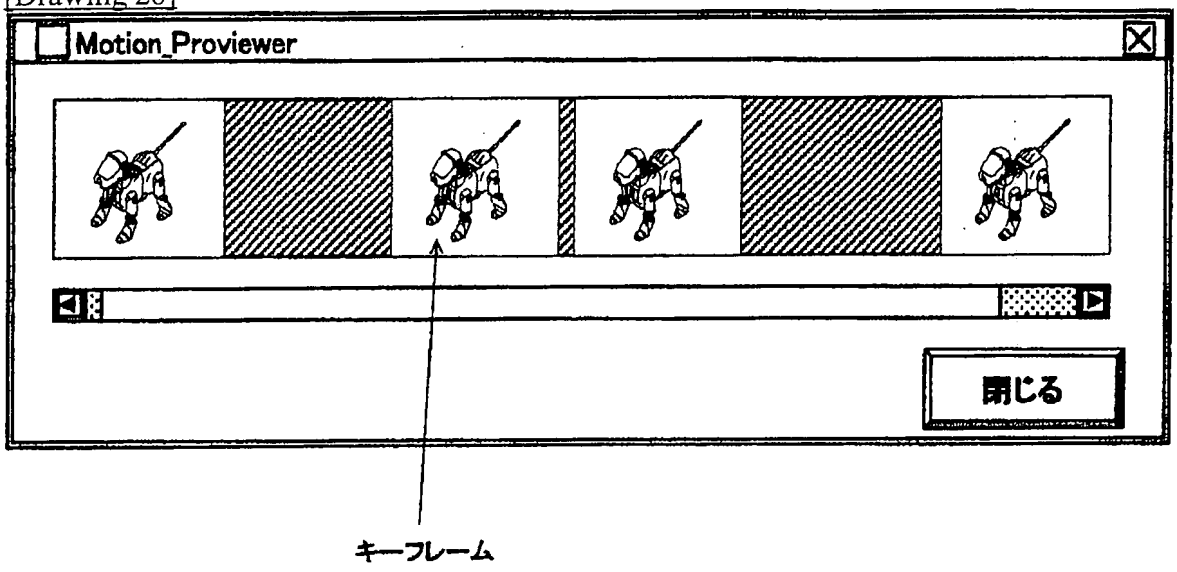

単位切り替え
ラジオ・ボタン
カレント時刻
表示フィールド
終了時刻表示
フィールド
時間ルーラ
キーフレーム・チャンネル
カレント時刻ライン
モーション・チャンネル
Action_Window
ファイル(F) 編集(E) 素材(S) ヘルプ(H)
04:60
09:40
sec
frame
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
04:60
Keyframe
Motion
Sound
LED
test.001 ABCG abcg
rate: 10 f/s
LED ON／OFF
チェック・ボックス
水平スクロール・バー
サウンド・チャンネル
LEDチャンネル
サウンドON／OFF
チェック・ボックス
キーフレーム・ライン
キーフレーム・ライン
終了時刻ライン
アクション編集ウィンドウ


キーフレーム
(初期ポーズ)
キーフレーム
キーフレーム
(最終ポーズ)
Action_Window
ファイル(F) 編集(E) 素材(S) ヘルプ(H)
04:60
09:40
sec
frame
00:00
01:00
02:00
03:00
04:00
05:00
04:80
06:00
07:00
08:00
09:00
10:00
KeyFrame
first: Standing
last: Standing
Motion
Sound
test.001 ABCG.abcg
LED
rate: 10 f/s
アクション編集ウィンドウ

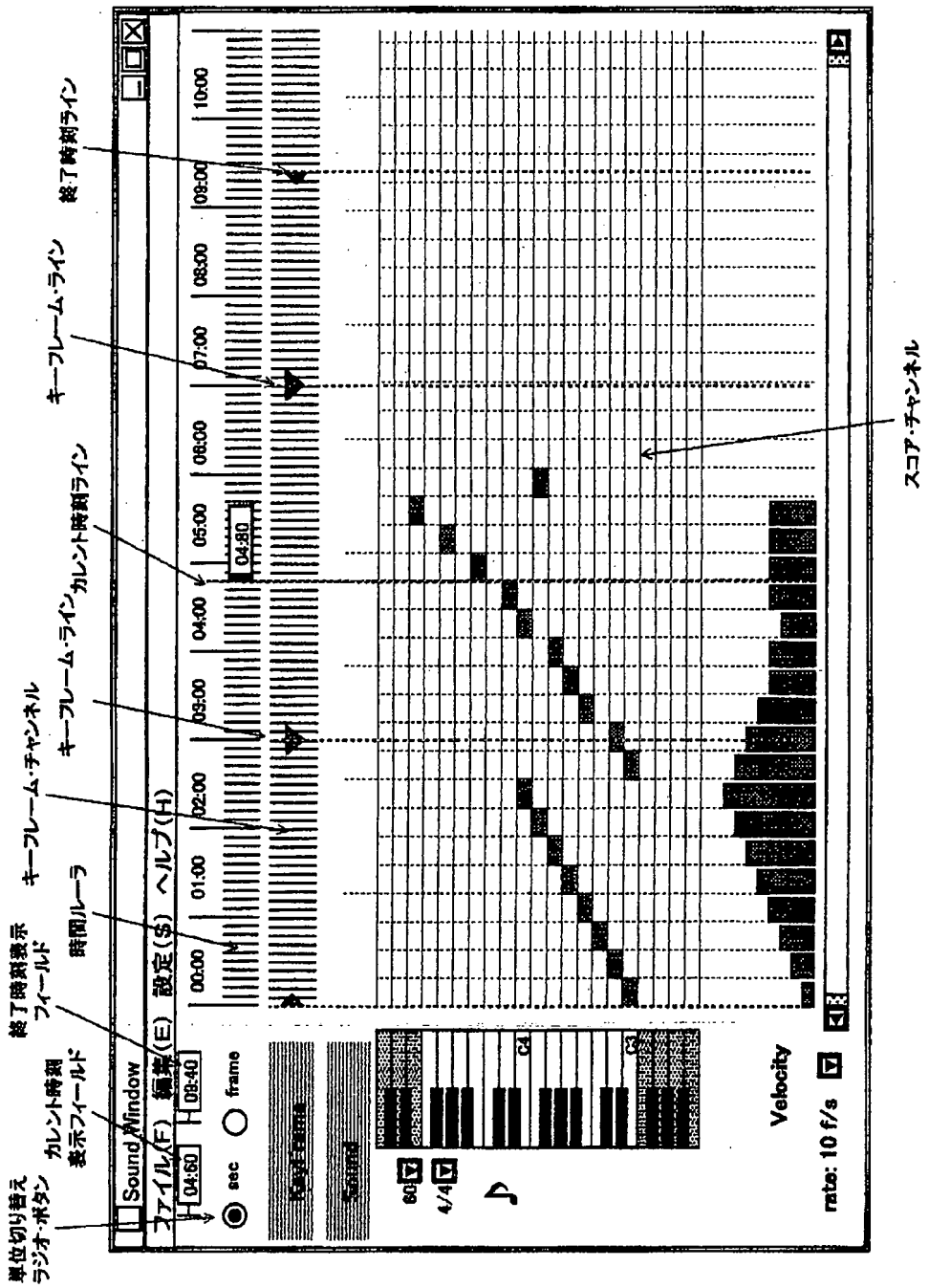
[Drawing 14]



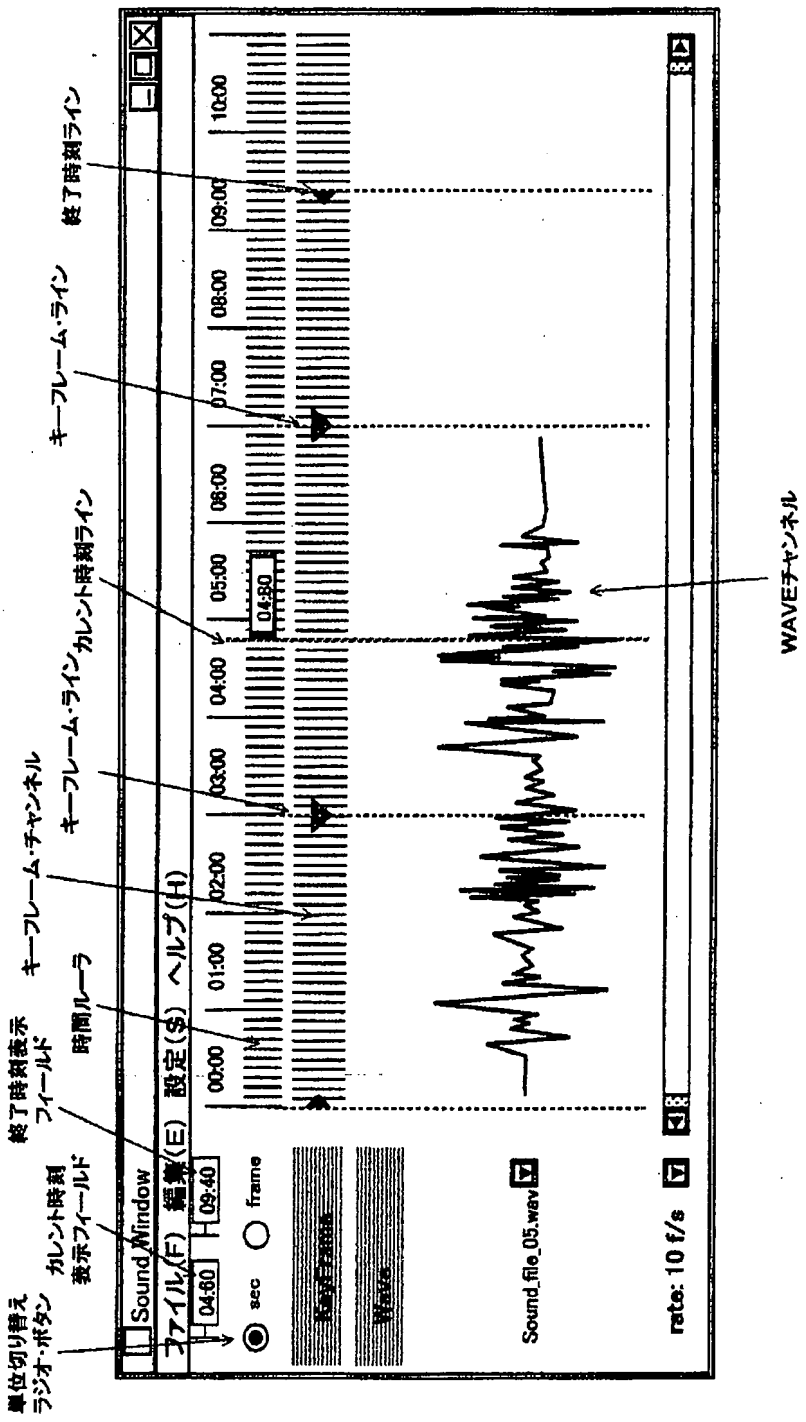
[Drawing 28]



[Drawing 15]

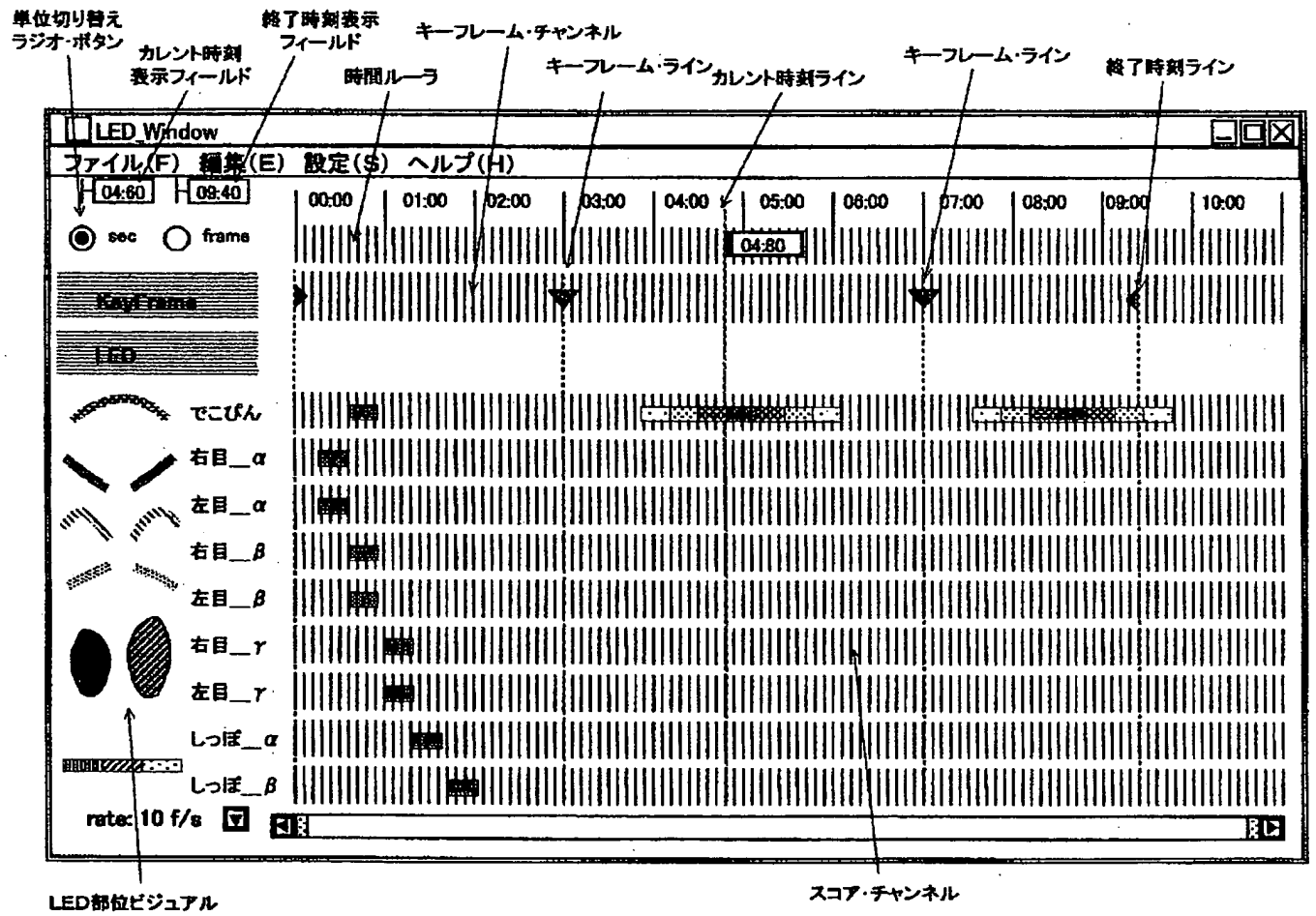

単位切り替え
ラジオ・ボタン
カレント時刻
表示フィールド
終了時刻表示
フィールド
時間ルーラ
キーフレーム・チャンネル
キーフレーム・ライン
カレント時刻ライン
キーフレーム・ライン
終了時刻ライン
スコア・チャンネル
Sound Window
ファイル(F) 編集(E) 設定($) ヘルプ(H)
04:60
08:40
sec
frame
00:00
01:00
02:00
03:00
04:00
04:80
05:00
06:00
07:00
08:00
08:00
10:00
Keyframe
Sound
60
4/4
C4
C3
Velocity
rate: 10 f/s

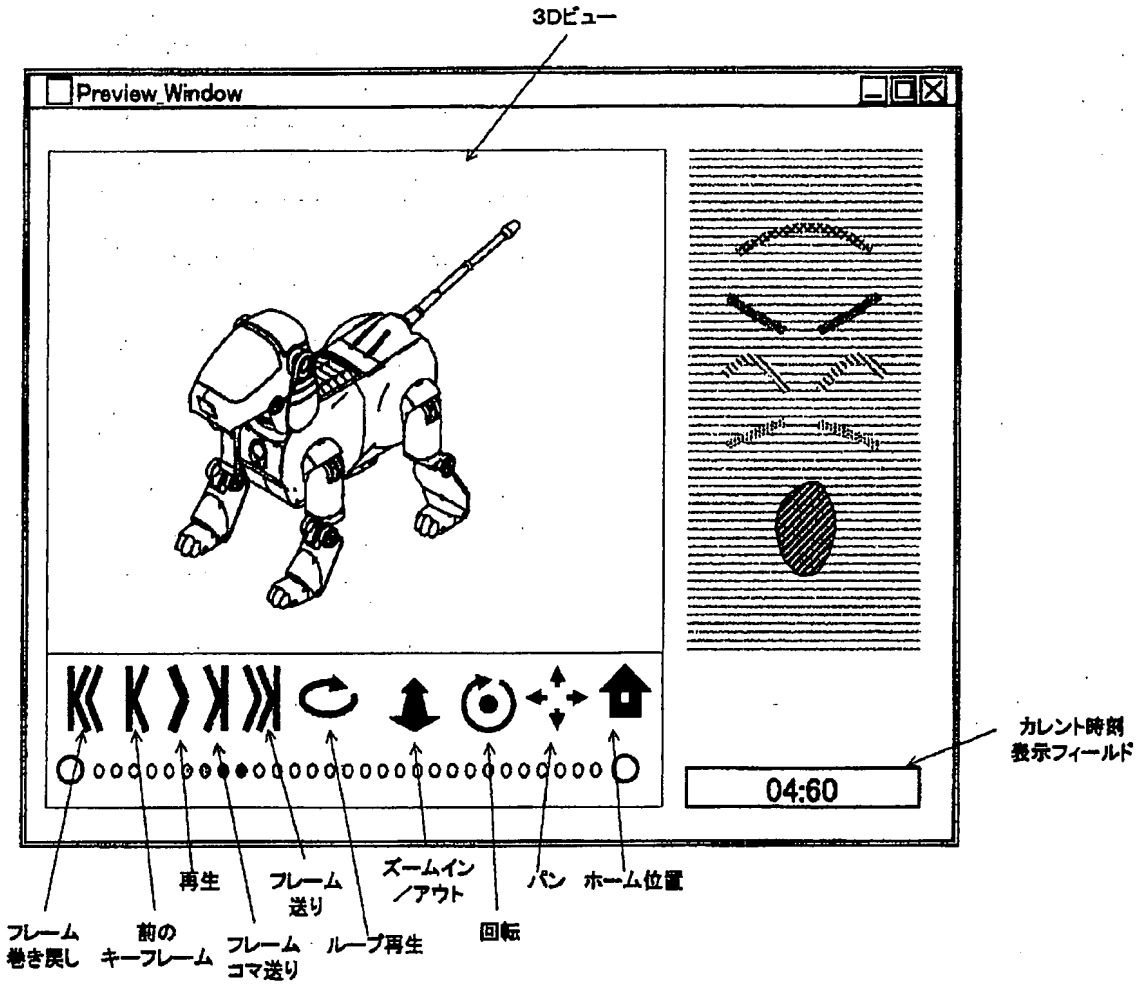
[Drawing 19]


単位切り替え
ラジオ・ボタン
カレント時刻
表示フィールド
終了時刻表示
フィールド
時間ルーラ
キーフレーム・チャンネル
キーフレーム・ライン
カレント時刻ライン
キーフレーム・ライン
終了時刻ライン
WAVEチャンネル
Sound Window
ファイル(F) 編集(E) 設定(S) ヘルプ(H)
04:80
09:40
sec
frame
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
04:80
Keyframe
Wave
Sound_file_05.wav
rate: 10 f/s

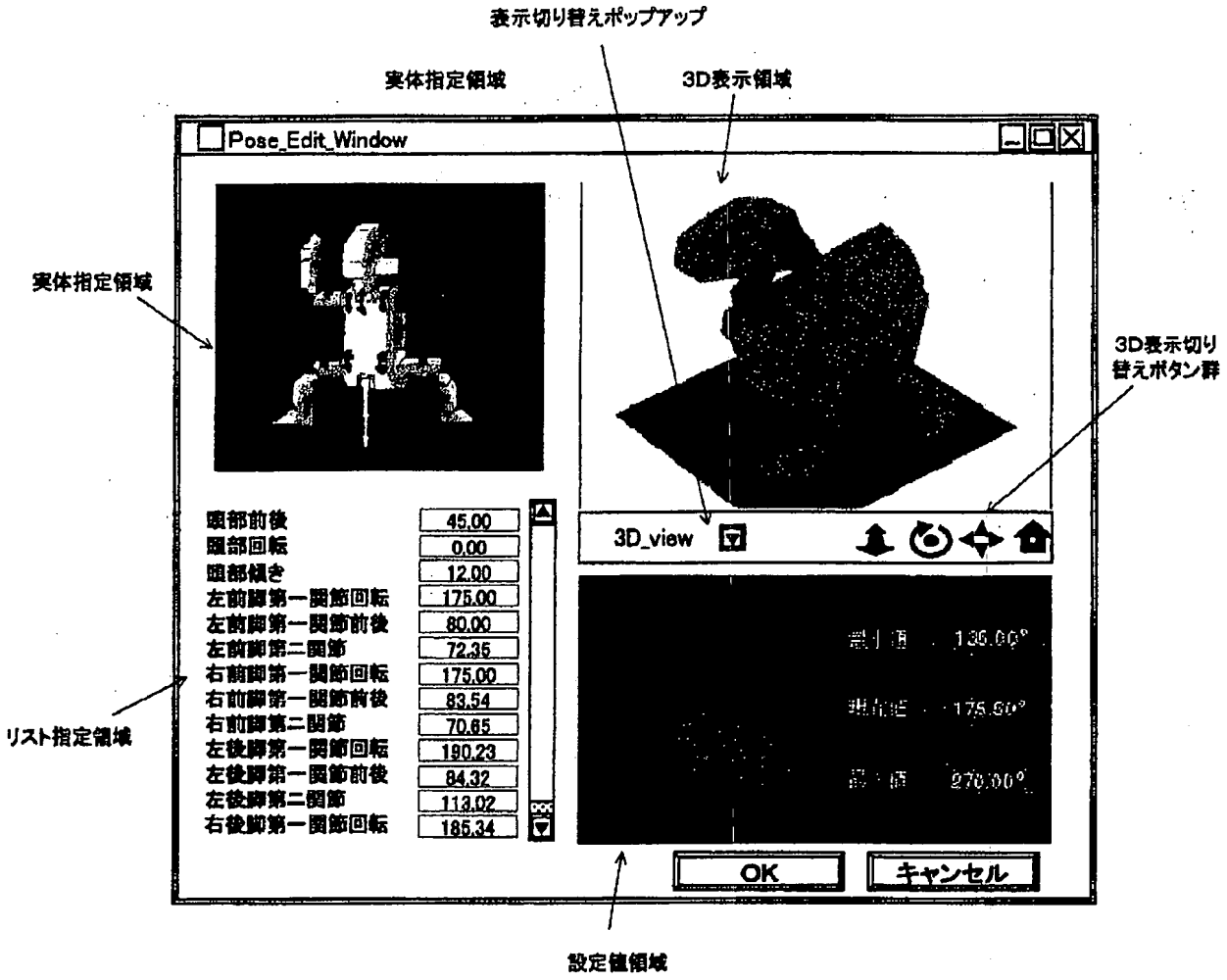
[Drawing 22]

[Drawing 25]

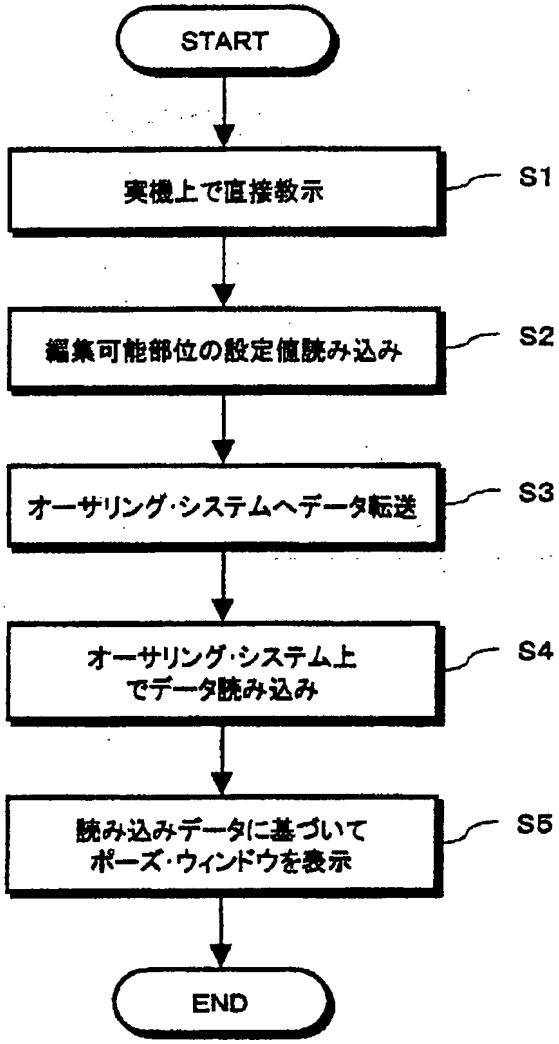

単位切り替え
ラジオ·ボタン
カレント時刻
表示フィールド
終了時刻表示
フィールド
時間ルーラ
キーフレーム·チャンネル
キーフレーム·ライン
カレント時刻ライン
キーフレーム·ライン
終了時刻ライン
LED_Window
ファイル(F) 編集(E) 設定(S) ヘルプ(H)
04:60
09:40
sec
frame
Keyframe
LED
でこぴん
右目__α
左目__α
右目__β
左目__β
右目__γ
左目__γ
しっぽ__α
しっぽ__β
rate: 10 f/s
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
04:80
LED部位ビジュアル
スコア·チャンネル


3Dビュー
Preview_Window
04:60
カレント時刻
表示フィールド
フレーム
巻き戻し
前の
キーフレーム
再生
フレーム
コマ送り
フレーム
送り
ループ再生
ズームイン
／アウト
回転
パン
ホーム位置

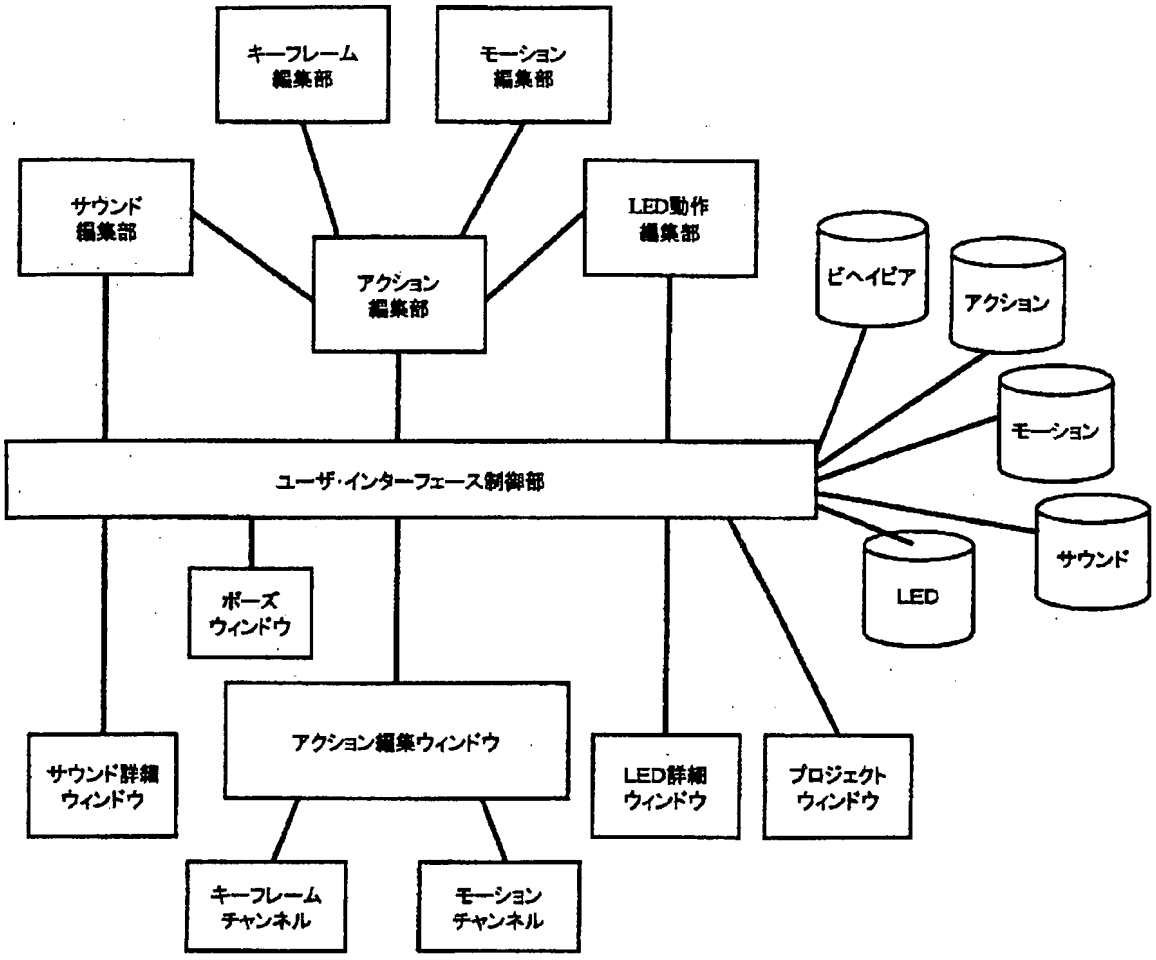
[Drawing 26]


表示切り替えポップアップ
実体指定領域
3D表示領域
Pose_Edit_Window
実体指定領域
3D表示切り
替えボタン群
頭部前後 45.00
頭部回転 0.00
頭部傾き 12.00
左前脚第一関節回転 175.00
左前脚第一関節前後 80.00
左前脚第二関節 72.35
右前脚第一関節回転 175.00
右前脚第一関節前後 83.54
右前脚第二関節 70.65
左後脚第一関節回転 190.23
左後脚第一関節前後 84.32
左後脚第二関節 113.02
右後脚第一関節回転 185.34
3D_view
OK
キャンセル
リスト指定領域
設定値領域

[Drawing 27]


START
実機上で直接教示
S1
編集可能部位の設定値読み込み
S2
オーサリング・システムへデータ転送
S3
オーサリング・システム上
でデータ読み込み
S4
読み込みデータに基づいて
ポーズ・ウィンドウを表示
S5
END

[Drawing 29]



[Translation done.]